Results of forest insect and disease surveys in the NORTHERN REGION of Ontario, 1991

CARRIED OUT BY THE GREAT LAKES FORESTRY CENTRE IN COOPERATION WITH THE ONTARIO MINISTRY OF NATURAL RESOURCES

W.A. Ingram, S. Payne and B.E. Smith

Miscellaneous Report No. 111

Forestry Canada Forêts Canada

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FORESTRY CANADA, ONTARIO REGION

Ontario Region is one of six regional establishments located across Canada and operated by Forestry Canada. The overall objective of Forestry Canada is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. Ontario Region pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

Ontario Region specializes in research in forest production, forest protection, forest environment and forest utilization. These programs deal directly with the issue of maintaining and enhancing the resource supply. Activities range from basic to applied and developmental research, and include a significant technology transfer component.

Major activities in forestry development include federal management responsibility for federal–provincial forest management agreements, participation in the National Forestry Statistics program and forest economics research.

Close working relationships are maintained with the Ontario Ministry of Natural Resources, the forest industry, educational institutions specializing in forestry and the biological sciences, and other forestry organizations within the province. Ontario Region is represented on the Ontario Forestry Council and the Ontario Forestry Research Committee, which have responsibility for coordinating forestry research in Ontario.

It is recognized that forested land must be managed in the best public interest, not only for the wood production essential to our economy, but also for the recreational purposes that are so important to our social well-being. This must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

92-05200/

RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE NORTHERN REGION OF ONTARIO 1991

Forest Districts:
Moosonee, Hearst, Kapuskasing, Cochrane,
Chapleau, Timmins, Kirkland Lake and Gogama

W.A. Ingram, S. Payne and B.E. Smith

FORESTRY CANADA
ONTARIO REGION
GREAT LAKES FORESTRY CENTRE

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SURVEY HIGHLIGHTS

This report documents the insects, diseases and abiotic conditions that were observed across Northern Region in 1991.

Across the region, a three-fold increase was recorded in the area of aerially mapped moderate-to-severe forest tent caterpillar defoliation. In all, 2,433,528 ha were defoliated this year compared with a total of 921,993 ha in 1990. Forecasts, based on egg-band counts, are for widespread expansions of all areas of current defoliation except in Timmins District, where populations appear to be declining.

Spruce budworm populations continued to expand in all areas sampled. The area of moderate-to-severe defoliation in Hearst District increased to 123,130 ha from 6,392 ha in 1990 and expanded northward into Moosonee District along the Kenogami River system. Egg-mass samples and pheromone trap results indicate a further expansion of the current infestation and a possibility of light-to-moderate infestations in the southern portions of the region. Jack pine budworm populations were also recorded at a number of locations across the region, but at levels that have caused no serious concerns as yet.

Birch skeletonizer populations defoliated a total of 1,684,184 ha, with moderate-to-severe damage across the middle of the region. Aspen also experienced moderate-to-severe defoliation over 147,670 ha in the southern portion of the region due to infestations by two separate leafcurlers.

In a continuing effort to monitor forest health, the two birch plots established in 1989 and the Acid Rain plots established in 1985 were revisited. Monitoring was also continued in the region's seed orchards and family-test sites established by the Ontario Ministry of Natural Resources (OMNR) across Northern Region.

Abiotic conditions that demanded attention included areas of blown-down timber, extensive areas of drought symptoms and several small areas of localized frost damage.

Black army cutworm pheromone traps were deployed in the larger burned areas and on available prescribed burn sites to monitor insect activity before replanting the sites in 1992.

The same format was followed in categorizing forest pests as in the 1990 Northern Region report:

Major Insects or Diseases

capable of causing severe injury to or death of living trees or shrubs

Minor Insects or Diseases

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs.

(cont'd)

Other Forest Insects and Diseases (Tables)

These tables provide information on two types of pest:

1) those that are of minor importance and have not been known to cause serious damage to forest trees, and
2) those that are capable of causing serious damage but, because of low population levels or for other reasons, did not cause serious damage in 1991.

The cooperation and assistance provided by personnel of OMNR, wood-using industries and other agencies, and of many individuals, are gratefully acknowledged.

W.A. Ingram
S. Payne
B.E. Smith

Frontispiece

Balsam fir (*Abies balsamea* [L.] Mill.) stand severely damaged by the eastern spruce budworm (*Choristoneura fumiferana* [Clem.]).

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INSECTS

Major Insects

Birch Skeletonizer,
Bucculatrix canadensisella Cham.

Increased populations in the northern portion of the region in 1990 expanded substantially in 1991. A total of 1,684,184 ha of moderate-to-severe defoliation of white birch (*Betula papyrifera* Marsh.) was aerially mapped throughout the region this year (Table 1).

Table 1. Summary of moderate-to-severe defoliation of white birch by the birch skeletonizer in the Northern Region of Ontario in 1991.

District	Area affected (ha)
Chapleau	875,615
Cochrane	226,469
Gogama	1,000
Hearst	150,525
Kapuskasing	300,800
Kirkland Lake	3,000
Timmins	126,375
Total	1,684,184

The main body of the infestation entered the region in the northwestern corner of Chapleau District and extended eastward across the entire region into the Lake Abitibi area on the Ontario–Quebec border. To the north, the infestation was bounded by the northern railroad line of the Canadian National Railway and on the south by Highway 101.

To the north and south of the main infestation, numerous small- to moderate-sized pockets of heavy infestation were recorded, primarily in old cutover areas, on esker ridges or in old fire areas where heavier concentrations of birch regeneration are located (Fig. 1).

Generally, defoliation ranged between 80 and 100% on all available hosts throughout the aerially mapped areas of moderate-to-severe defoliation. However, individual severely defoliated trees were recorded throughout the remainder of the region, but more commonly at 20 to 60% defoliation levels.

This cyclic defoliator of birch was last recorded at significant levels in the region in 1981, and remained active for a period of 5 years before subsiding to trace levels in 1986. The occurrence of this insect late in the growing season (mid-August) reduces its importance to a much lower level, since even if widespread defoliation does occur, little to no damage is recorded on the host other than a loss in tree vigor.

Eastern Spruce Budworm,
Choristoneura fumiferana (Clem.)

A major increase in the area of moderate-to-severe defoliation has taken place across the province. This year, 9,065,781 ha were aerially mapped, compared with 6,783,261 ha in 1990 and 6,239,636 ha in 1989.

The main body of the infestation is still located in the Northwestern and North Central regions, but has now extended eastward to include areas in the northwestern corner of Wawa District in Northeastern Region and the southwestern side of Hearst District in Northern Region. Increases in population levels have taken place in the Algonquin and Central regions as well (Fig. 2).

Moderate-to-severe defoliation in the region has expanded to 123,130 ha from the 6,392 ha reported in 1990. The majority of the infestation extends from Geraldton District into Hearst District (over 120,770 ha) along a wide band across the western boundary of Hearst District. The remainder of the infestation is made up of small, widely scattered pockets east of the main body and along many of the large rivers in the northern half of the Hearst District. Pockets of defoliation extended along the Kenogami River north into Moosonee District, where a further 2,360 ha were mapped (Fig. 3).

Pheromone trapping was carried out to monitor the abundance of male moths in impact plots and at scattered locations in the region using Biolure® traps. The results of this trapping show that an increased moth population occurred across the region, especially in Hearst District (Table 2).

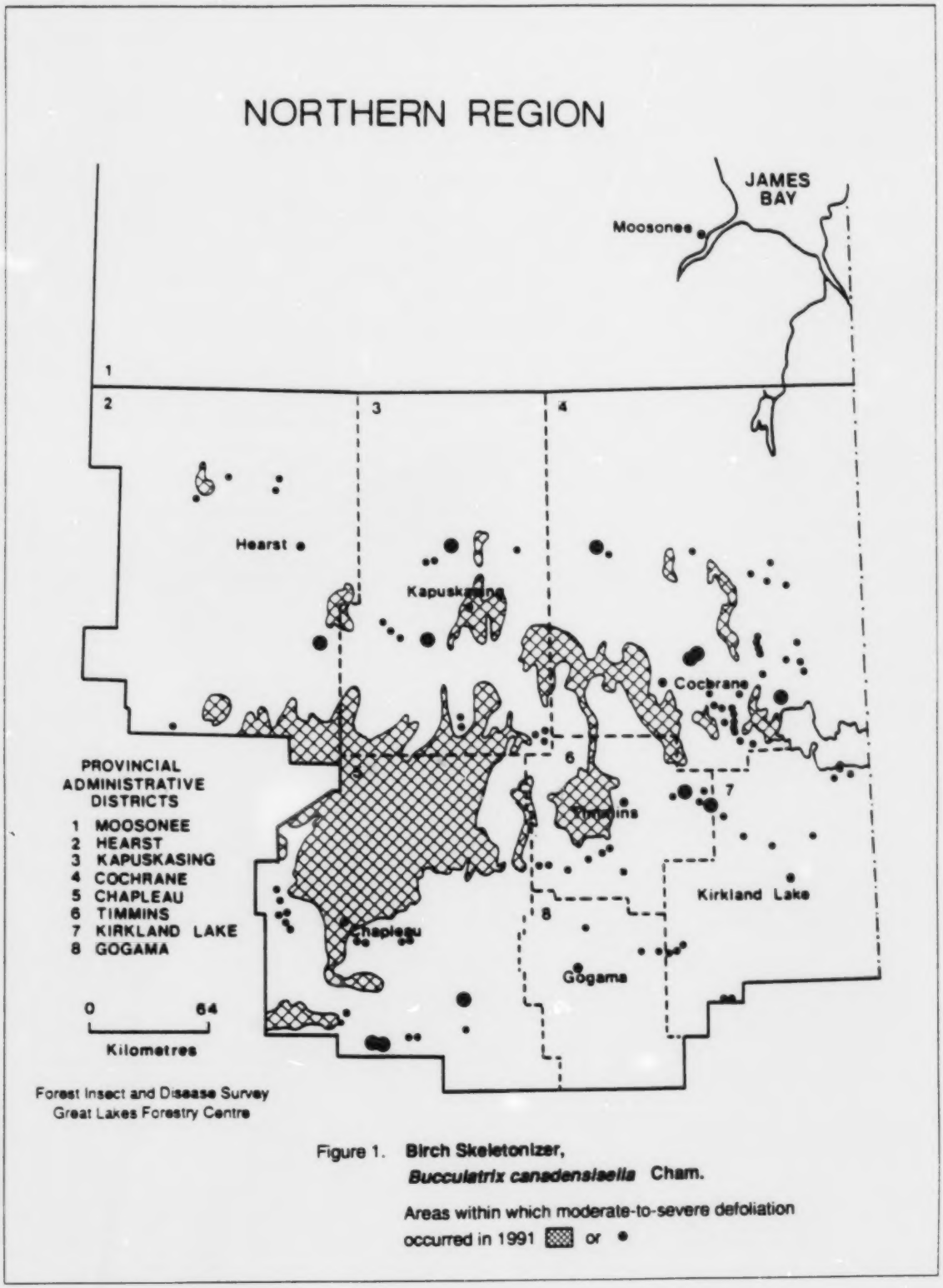


Figure 1. **Birch Skeletonizer, *Bucculatrix canadensisella* Cham.**

Areas within which moderate-to-severe defoliation occurred in 1991 ▩ or ●

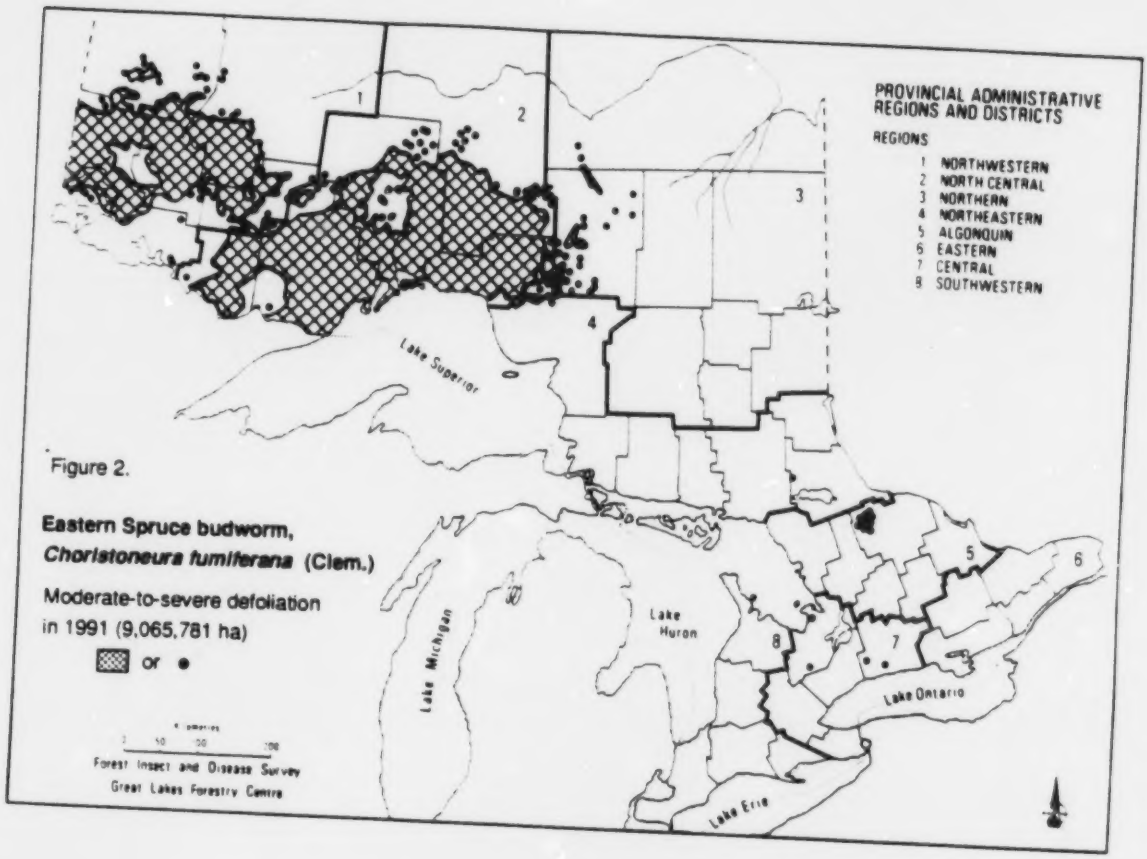


Figure 2.

For the past few years, counts of captured moths in light traps at the Chapleau Nursery and at Remi Lake, near Kapuskasing, have been constant or have increased. This year, something unusual occurred: almost no moths were caught (Table 3). This observation does not coincide with the general increase in populations observed in either area.

Egg-mass sampling was carried out at 76 locations across the region (Table 4). Results show that severe defoliation should occur over much of the western, northern and central portions of Hearst District. The remaining districts should experience only moderate or even less defoliation in 1992.

Jack Pine Budworm,
Choristoneura p. pinus Free.

A sharp provincewide increase in the area affected by this pest was recorded in 1991. A total of 133,618 ha of moderate-to-severe defoliation was aerially mapped, compared with 30,325 ha in 1990 (Fig. 4).

Population levels on jack pine (*Pinus banksiana* Lamb.) increased slightly across the region in 1991, resulting in light defoliation in a number of plantations. The heaviest defoliation was recorded in the Sultan area of Chapleau District and the Calstock and Hornpayne areas of Hearst District. From egg-mass samples collected across the region, we forecast continual light infestations in the Hearst and Chapleau districts (Table 5).

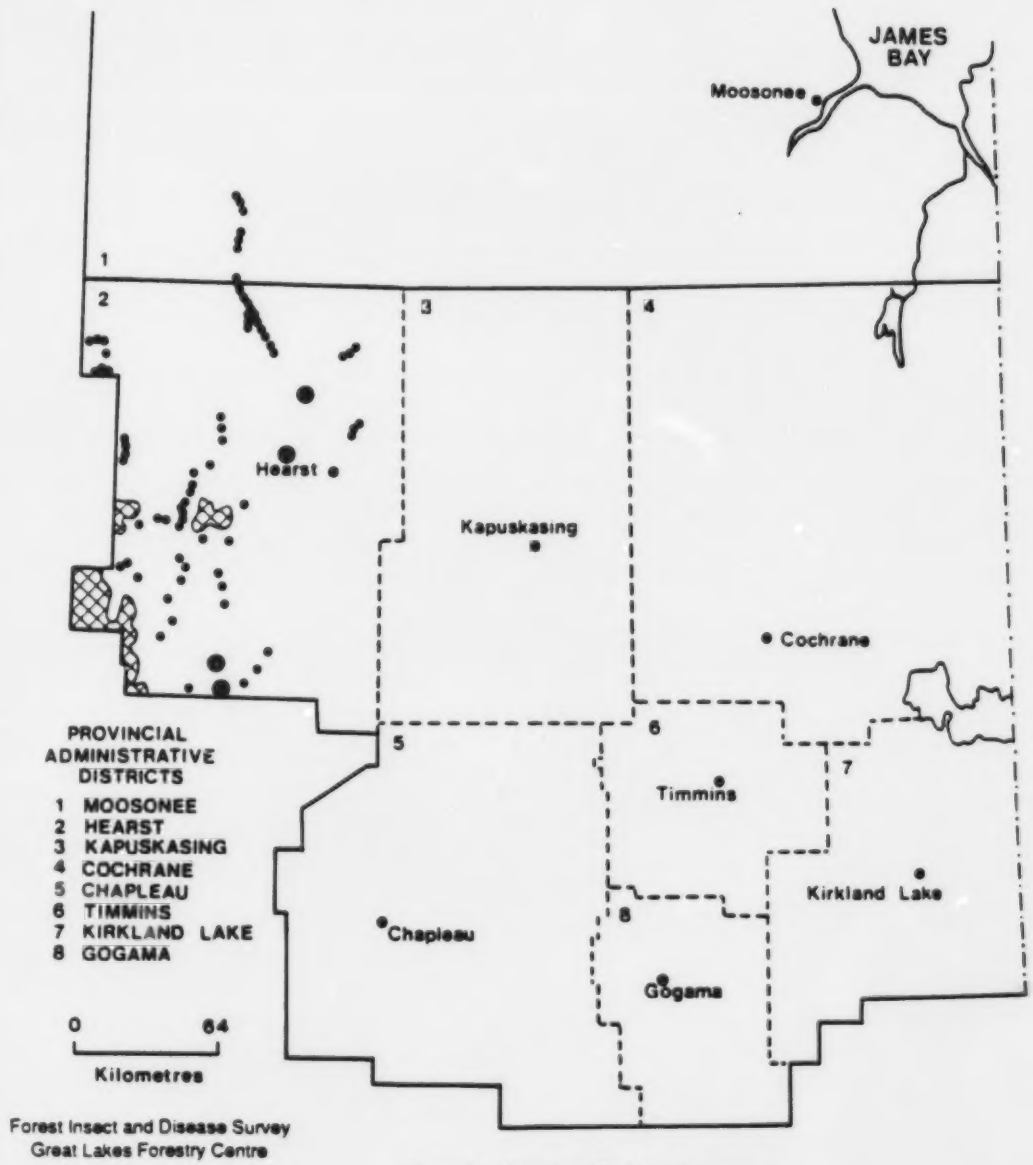


Figure 3. **Eastern Spruce budworm, *Choristoneura fumiferana* (Clem.)**

Areas within which moderate-to-severe defoliation occurred in 1991 ▩ or ●

Table 2. Captures of male eastern spruce budworm moths in pheromone traps in six districts of the Northern Region of Ontario, 1990–1991 (three traps at each location).

Location (Twp)	Total moths captured 1990	1991
Chapleau District		
Neelands	15	–[a]
Peters	31	109
Cochrane District		
St. John	46	288
Gogama District		
Dublin	15	44
Hearst District		
Frost	752	2,936
Larkin	243	1,699[b]
Kapuskasing District		
Fauquier	43	709
Guilfoyle	33	890
Kirkland Lake District		
Maisonville	15	301
Pacaud	37	247

[a] data unavailable

[b] one trap destroyed by a bear

Table 3. Captures of eastern spruce budworm moths in light traps at two locations in the Northern Region of Ontario in 1989, 1990 and 1991.

Location	Total number of moths captured 1989	1990	1991
Chapleau District			
Chapleau Nursery	182	159	8
Kapuskasing District			
Remi Lake	75	352	7

Eastern Pine Shoot Borer,
Eucosma gloriola Heinr.

Damage caused by this pest of jack pine increased across much of Northern Region in 1991 (Table 6). The largest increases occurred in the Cochrane, Timmins and Kirkland Lake districts, while damage levels throughout the Chapleau and Gogama districts remained at much the same levels as in 1990 (Table 6). The heaviest damage occurred in Strom Township, Chapleau District, where 32.7% of the leaders of the 0.8-m trees in a 30-ha plantation were attacked.

This shoot borer affects all growth of terminal shoots on the tree, but is only considered serious when leaders are affected because tree form may be severely damaged.

Table 4. Northern Region – Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1991, and infestation forecasts for 1992.

Location	Host	Estimated defoliation in 1991 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1992[a]	Accumulated damage[b]
Chapleau District (10 locations)					
Barclay Twp	bF	4	0	0	0
Borden Twp	bF	2	13	L–M	0
Brackin Twp	bF	9	0	0	0
Ivanhoe Twp	bF	3	0	0	0
Lloyd Twp	wS	2	9	L	0
Neelands Twp impact plot	bF	3	0	0	0
Peters Twp – Shoals Prov. Park	bF	4	0	0	0
Racine Twp	bF	1	0	0	0
Reaney Twp – Five Mile Prov. Park	bF	0	0	0	0
Reeves Twp	wS	2	0	0	0

(cont'd)

Table 4. Northern Region – Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1991, and infestation forecasts for 1992 (cont'd).

Location	Host	Estimated defoliation in 1991 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1992[a]	Accumulated damage[b]
Cochrane District (5 locations)					
Clute Twp – OMNR SPA[c]	wS	0	0	0	0
Fournier Twp – OMNR SPA[c]	wS	0	0	0	0
Laughton Twp	bF	0	0	0	0
Marathon Twp	bF	0	0	0	0
St. John Twp – Stand 177	bF	0	0	0	0
Gogama District (3 locations)					
Dublin Twp	bF	1	0	0	0
Garvey Twp	bF	1	14	L–M	0
St. Louis Twp	wS	1	0	0	0
Hearst District (47 locations)					
Arnott Twp	bF	11	28	L–M	1
	wS	64	359	S	1
Bayfield Twp[d]	bF	71	332	S	2
Breckenridge Twp[d]	wS	53	343	S	1
Chelsea Twp– check plots	bF	11	182	M–S	1
	wS	47	346	S	1
Chelsea Twp[d]	bF	5	135	M–S	1
Derry Twp	bF	29	123	M–S	1
Elgie Twp	bF	47	66	M–S	1
Ermine Twp	wS	3	87	M–S	1
Foch Twp	wS	8	494	S	1
Franz Twp	bF	3	22	L–M	1
Frost Lake	bF	59	315	S	1
Frost Twp – Nagagamisis Prov. Park[d]	bF	6	84	M–S	1
	wS	11	23	L–M	1
– check plot	bF	38	414	S	1
	wS	55	824	S	1
– impact plot	bF	23	161	M–S	1
	wS	62	417	S	1
Fushimi Prov. Park[d]	bF	52	43	L–M	1
	wS	30	65	M–S	1
– check plot	bF	31	302	S	1
	wS	38	183	M–S	1
Gourlay Twp	bF	23	95	M–S	1
Hiawatha Twp	bF	48	176	M–S	1
Kohler Twp	bF	48	133	M–S	1
Larkin Twp – impact plot	bF	3	0	0	1
	wS	6	302	S	1
	bS	0	0	0	0
Lessard Twp	bF	5	0	0	1
Lipton Twp[d]	wS	23	30	L–M	1
Lizar Twp	wS	5	139	M–S	1

(cont'd)

Table 4. Northern Region – Eastern Spruce Budworm: Summary of defoliation estimates and egg-mass counts in 1991, and infestation forecasts for 1992 (concl.).

Location	Host	Estimated defoliation in 1991 (%)	Number of egg masses per 9.29 m^2 of foliage	Infestation forecasts for 1992[a]	Accumulated damage[b]
Hearst District (concl.)					
Lowther Twp	bF	8	174	M–S	1
McEwing Twp	bF	5	28	L–M	1
Mulloy Twp	wS	72	346	S	1
Newlands Twp	bF	10	0	0	0
Rogers Twp – Plantation 26A	bF	30	467	S	1
	wS	2	447	S	1
Shannon Twp	bF	2	0	0	1
Shuel Twp	wS	54	439	S	1
Staunton Twp	bF	3	0	0	1
Strickland Twp – check plot	bF	34	23	L–M	1
	wS	64	173	M–S	1
Studholme Twp	wS	9	79	M–S	1
Walls Twp	wS	3	0	0	1
Wickstead Twp – check plot	bF	51	167	M–S	1
	wS	44	196	M–S	1
Kapuskasing District (3 locations)					
Cumming Twp	wS	0	0	0	0
Fauquier Twp					
– René Brunelle Prov. Park	bF	2	0	0	0
Guilfoyle Twp	bF	0	0	0	0
Kirkland Lake District (5 locations)					
Bannockburn Twp	bF	3	0	0	0
Dack Twp	wS	1	0	0	0
Lamplugh Twp	bF	0	0	0	0
Maisonville Twp	bF	0	7	L	0
Pacaud Twp	bF	0	0	0	0
Timmins District (3 locations)					
Hassard Twp	bF	4	0	0	0
Sewell Twp	bF	2	0	0	0
Thomas Twp	wS	2	19	L–M	0

[a] S = severe, M = moderate, L = light, 0 = nil

[b] accumulated damage codes: 0 = undamaged; 1 = light damage, <25% total defoliation, usually one season of severe defoliation

[c] SPA = seed production area

[d] Aerially sprayed with *B. t.* in 1991

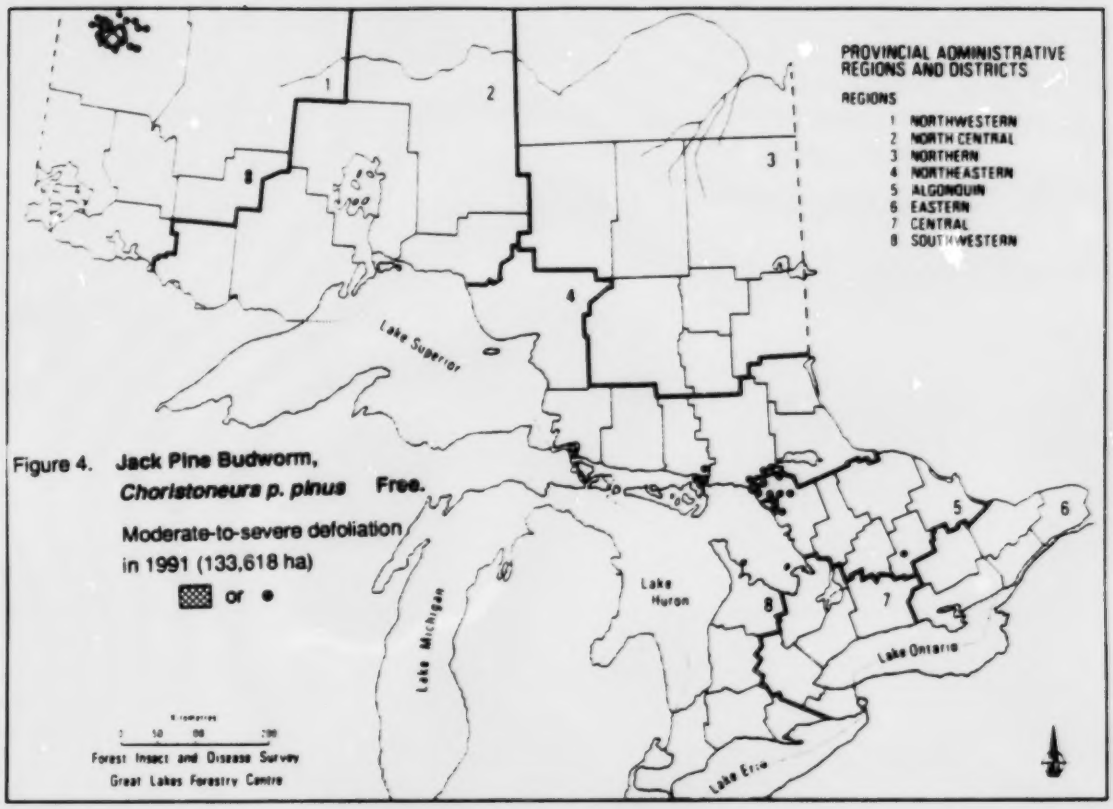


Figure 4. **Jack Pine Budworm, *Choristoneura p. pinus* Free.**
Moderate-to-severe defoliation in 1991 (133,618 ha)
▩ or ●

Table 5. Northern Region – Jack Pine Budworm: Summary of defoliation estimates and egg-mass counts in 1991 and infestation forecasts for 1992 on jack pine in the Northern Region of Ontario.

Location	Estimated % defoliation 1991	Total number of egg masses on six 61-m branch tips	Infestation forecasts for 1992
Chapleau District			
Cortez	0	0	nil
Deans	0	1	light
Edith	3	0	nil
Peters	1	0	nil
Strom	1	0	nil
Wakami	1	0	light
Cochrane District			
Avon	0	0	nil
Dempsey	0	0	nil
Gogama District			
Invergarry	0	0	nil
Noble	0	0	nil
Vrooman	0	0	nil
Hearst District			
Gill	0	1	light
Larkin	0	1	light

(cont'd)

Table 5. Northern Region – Jack Pine Budworm: Summary of defoliation estimates and egg-mass counts in 1991 and infestation forecasts for 1992 on jack pine in the Northern Region of Ontario (concl.).

Location	Estimated % defoliation 1991	Total number of egg masses on six 61-m branch tips	Infestation forecasts for 1992
Kapuskasing District			
Fauquier	0	0	nil
Kirkland Lake			
Chamberlain	0	0	nil
Clifford	0	0	nil
Mickle	0	0	nil
Timmins District			
Adams	0	0	nil
Evelyn	0	0	nil
Robb	0	0	nil

Table 6. Damage caused by the eastern pine shoot borer in jack pine plantations in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Leaders attacked (%)
Chapleau District					
Birch	1.0	2,500	15	5.7	5.7
Borden	0.8	2,500	25	4.0	4.0
Borden	0.9	2,500	50	6.7	6.7
Dalmas (Island Lake TIA)[a]	2.3	2,500	24	6.7	6.7
Delmage	0.9	2,500	50	7.3	7.3
Fawn	3.1	1,500	10	2.7	2.7
Keith	2.4	1,500	30	3.3	3.3
Neelands	2.0	2,500	5	9.3	9.3
Reaney	1.4	2,500	100	5.6	5.6
Strom	0.8	2,500	30	32.7	32.7
Cochrane District					
Findlay	1.0	2,000	25	17.3	15.3
Kennedy	2.1	2,100	1	15.3	6.7
Mortimer	2.4	2,500	30	13.3	11.3
Wacausta	2.0	2,100	100	1.0	0.0
Kirkland Lake District					
Ben Nevis	2.6	3,500	10	12.7	2.7
Catharine	2.4	3,700	15	29.3	8.0
Chamberlain	3.8	2,500	10	30.7	6.0
Flavelle	1.8	2,400	10	12.7	4.7
Lawson	2.1	2,500	40	20.0	10.0
Ossian	1.2	2,500	5	4.7	4.0
Pense	2.5	4,200	40	23.3	7.3
Playfair	1.1	2,500	10	18.0	16.0
Pontiac	1.3	4,200	10	10.7	8.0
Tyrell	0.9	2,500	20	2.0	0.7
Timmins District					
Enid	1.4	4,200	20	6.7	4.0
Evelyn	0.8	2,200	50	2.7	1.3
Macklem	3.0	2,000	4	36.7	18.7

[a] Tree improvement area

Birch Leafminer,
Fenusa pusilla (Lep.)

Population levels of this leafminer remained high in the Kirkland Lake and Timmins districts. Widely scattered pockets of damage to white birch were aerially sketch-mapped in 1- to 2-ha stands between the communities of Timmins and Matheson. Defoliation in natural stands ranged from 50 to 100%. Ornamental trees sustained complete defoliation at numerous locations throughout the region.

An increase in population levels resulted in 100% defoliation on scattered individual trees around the town of Chapleau in Chapleau District. Natural stands along Highway 631 north of the town of Hornepayne in Hearst District, and around Greenwater Provincial Park in Cochrane District, sustained 75% foliar damage in widely scattered pockets up to 1 ha in size.

Forest Tent Caterpillar,
Malacosoma disstria Hbn.

The forest tent caterpillar infestation has expanded (as predicted in last year's report) across the western and northern half of the province. The infestation has doubled in size to 18,870,508 ha from 9,480,408 ha in 1990. The largest increases occurred in the northwestern and northern parts of the province. A decline has occurred in the central and southern regions of the province, where the infestation has run its natural course (Fig. 5).

In Northern Region, the area of moderate-to-severe defoliation has almost tripled, to 2,433,528 ha in 1991 from 921,993 ha in 1990 (Table 7). The defoliation in Hearst District has now joined up with the massive infestation to the west (Fig. 6); it extends halfway across Kapuskasing District and as far north as trembling aspen

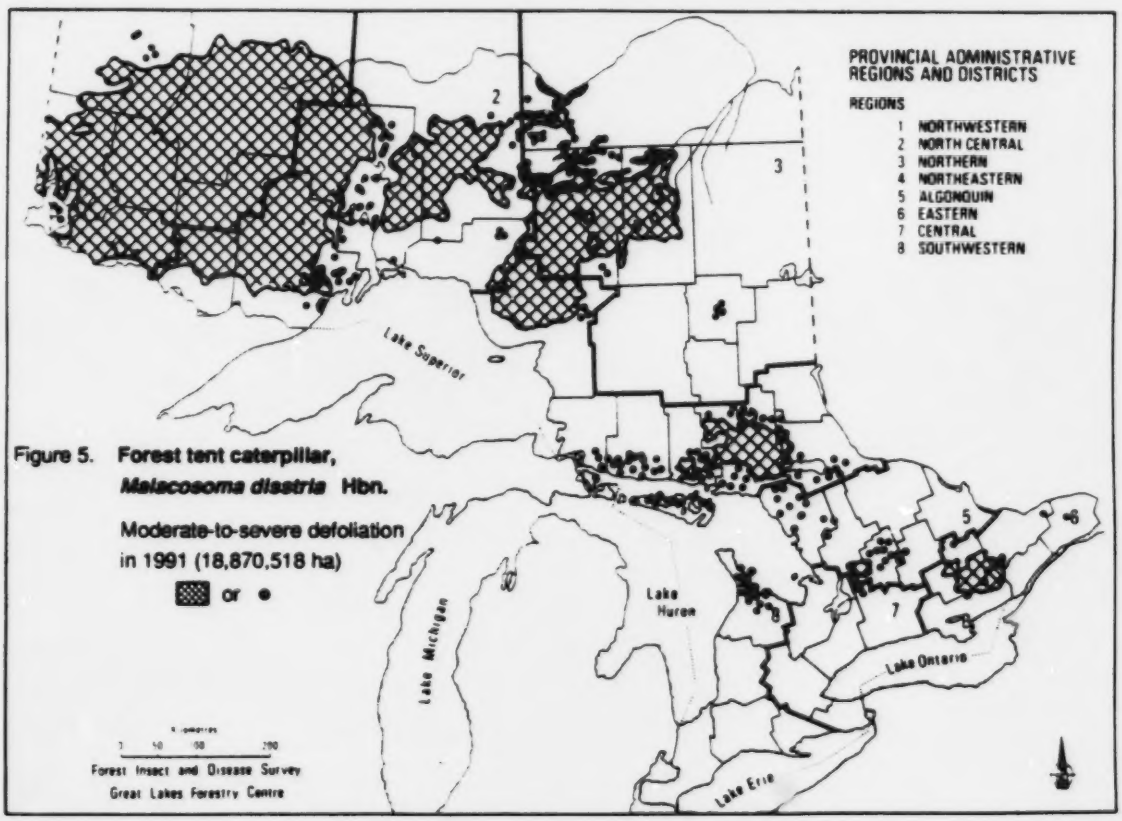


Figure 5. **Forest tent caterpillar, *Malacosoma disstria* Hbn.**

(*Populus tremuloides* Michx.) grows. Many small pockets were also aerially sketch-mapped east of the main body of the infestation. A small infestation near the city of Timmins, Timmins District, has increased in size to 495 ha.

Table 7. Comparison of areas of defoliation by the forest tent caterpillar in the Northern Region of Ontario in 1990 and 1991.

	Defoliation (ha)		
District	1990	1991	Change (ha)
Hearst	789,396	1,580,289	+790,893
Kapuskasing	85,981	762,729	+676,748
Moosonee	46,446	90,015	+43,569
Timmins	170	495	+325
Total	921,993	2,433,528	+1,511,535

The main body of the infestation extends from the western side of the region to west of the Algoma Central Railway tracks. It extends north to the village of Oba in southern Hearst District and east to the town of Fauquier, Kapuskasing District. From here, it extends north to Smoky Falls and west across the Kapuskasing and Hearst districts. It also extends up all major rivers into Moosonee District as far as the aspen grows. A marginal expansion of the area of moderate-to-severe defoliation was recorded in Mountjoy Township, in the area adjacent to the junction of highways 101 and 576, and just south of the Timmins Airport, Timmins District.

Extensive egg-band sampling across the infested area of the region (Table 8) indicates that the infestation should increase in 1992. All of Hearst District should be defoliated, and all but the most southerly portion of Kapuskasing District should sustain defoliation. Cochrane District should have moderate-to-severe defoliation moving east from Kapuskasing District and stopping short of the town of Cochrane. There should be an increase in populations in the northwestern corner of Chapleau District. All indications are that the infestation around the city of Timmins, Timmins District, should decrease (Fig. 7).

High population levels of the parasitic fly *Arachnidomyia aldrichi* (Park) are starting to develop in the northern portion of Hearst District. High population levels of this fly are normally a sign of the imminent collapse of an infestation.

Redheaded Jack Pine Sawfly,
Neodiprion virginiana complex

In 1991 there was a steep decline in both population levels of this mid-summer pest of jack pine and resultant defoliation in Chapleau District. For example, a 200-ha plantation in Alcona Township had 80% of the 3-m trees attacked in 1990, with an average defoliation of 45%; in 1991, only 45% of the trees were attacked, with an average defoliation of 12%. This decline was typical of the status of this pest in 1991.

As in 1990, the open-growing 5-m trees at the Muldrew Lake boat launch area, Dublin Township, Gogama District, were attacked by this sawfly. Defoliation averaged 25%, but damage from this insect was combined with damage from earlier feeding by the blackheaded jack pine sawfly (*Neodiprion pratti banksianae* Roh.).

Elsewhere in the region, 5 to 10% defoliation was commonly recorded on small groups of trees.

Yellowheaded Spruce Sawfly,
Pikonema alaskensis (Roh.)

Population levels of this mid-summer pest remained much the same as in 1990. As in previous years, the heaviest damage was recorded on roadside, fringe or ornamental trees growing in open situations.

The heaviest damage recorded was in the Fraserdale area of Cochrane District, in a 200-ha plantation of 2.1-m white spruce (*Picea glauca* [Moench] Voss), which sustained an average of 93% defoliation. Repeated defoliation at this location has resulted in a cumulative mortality rate of 9.3%.

Moderate defoliation was recorded on approximately 40% of the ornamental trees throughout the town of Chapleau. Repeated defoliation over the past 5 years in Chapleau has resulted in mortality of between 10 and 15% of the abovementioned ornamentals.

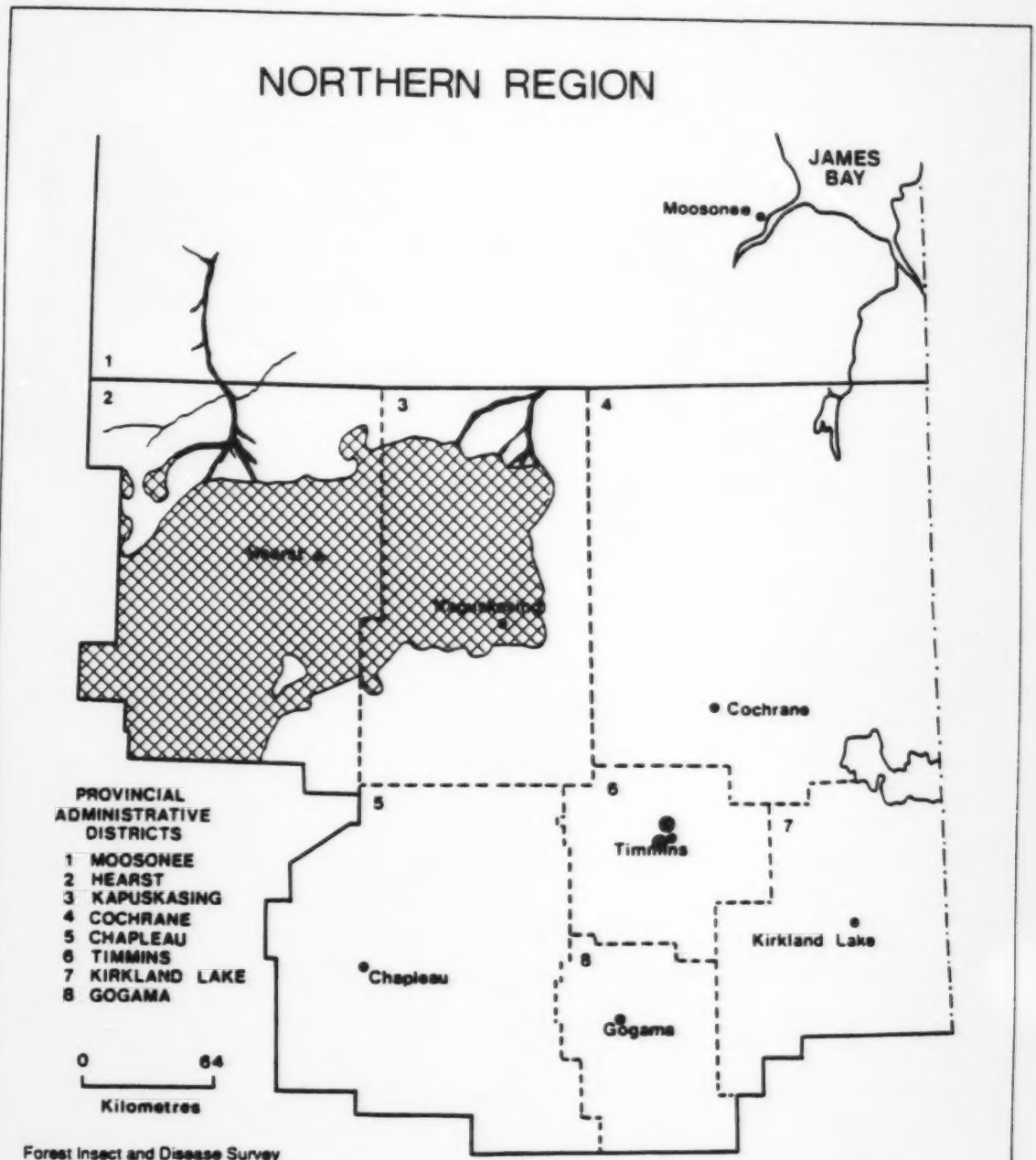


Figure 6. **Forest tent caterpillar, *Malacosoma disstria* Hbn.**

Areas within which moderate-to-severe defoliation occurred in 1991 ▨ or ●

In the Aidie Creek black spruce (*Picea mariana* [Mill.] B.S.P.) seed orchard in Chamberlain Township, Kirkland Lake District, 10.7% of the 1.8-m trees were affected, with an average of 14% defoliation.

Elsewhere in the region, moderate-to-severe defoliation was recorded frequently on ornamental trees.

Table 8. Results of forest tent caterpillar egg-band counts on trembling aspen in the Northern Region of Ontario in 1991 and infestation forecasts for 1992 (based on three trees sampled at each location).

Location (Twp)	Average DBH of trees (cm)	Average number of egg bands per tree	Infestation forecast for 1991
Chapleau District			
Brackin	12	11.0	Severe
Cochrane District			
Calder	16	5.7	Moderate
Duff	16	3.0	Light
Glackmeyer	17	3.3	Light
Kendrey	16	10.3	Severe
Pinard	16	145.0	Severe
Gogama District			
Dublin	13	0.0	Nil
Hearst District			
Gourlay	18	550.0	Severe
Hook	16	7.3	Moderate
McMillan	16	213.0	Severe
Pelletier	17	25.3	Severe
Ritchie	17	233.0	Severe
Rogers	18	145.0	Severe
Shetland	17	242.0	Severe
Wicksteed	16	333.0	Severe
Kapuskasing District			
Guilfoyle	18	144.0	Severe
Idington	16	321.0	Severe
Seaton	16	5.3	Light
Shackleton	18	36.0	Severe
Kirkland Lake District			
Bowman	9	1.3	Light
Taylor	7	0	Nil
Timmins District			
Mountjoy (Mattagami Height)	9	3.0	Light
Mountjoy (Kraft Creek)	8	0.3	Light
Mountjoy (Kamiskotia Turnoff)	7	2.0	Light
Mountjoy (Dam Road)	11	5.0	Light
Mountjoy (Mattagami River)	7	1.0	Light
Mountjoy (North of dam)	7	0	Nil
Ogden	11	4.3	Light
Whitney	7	1.7	Light

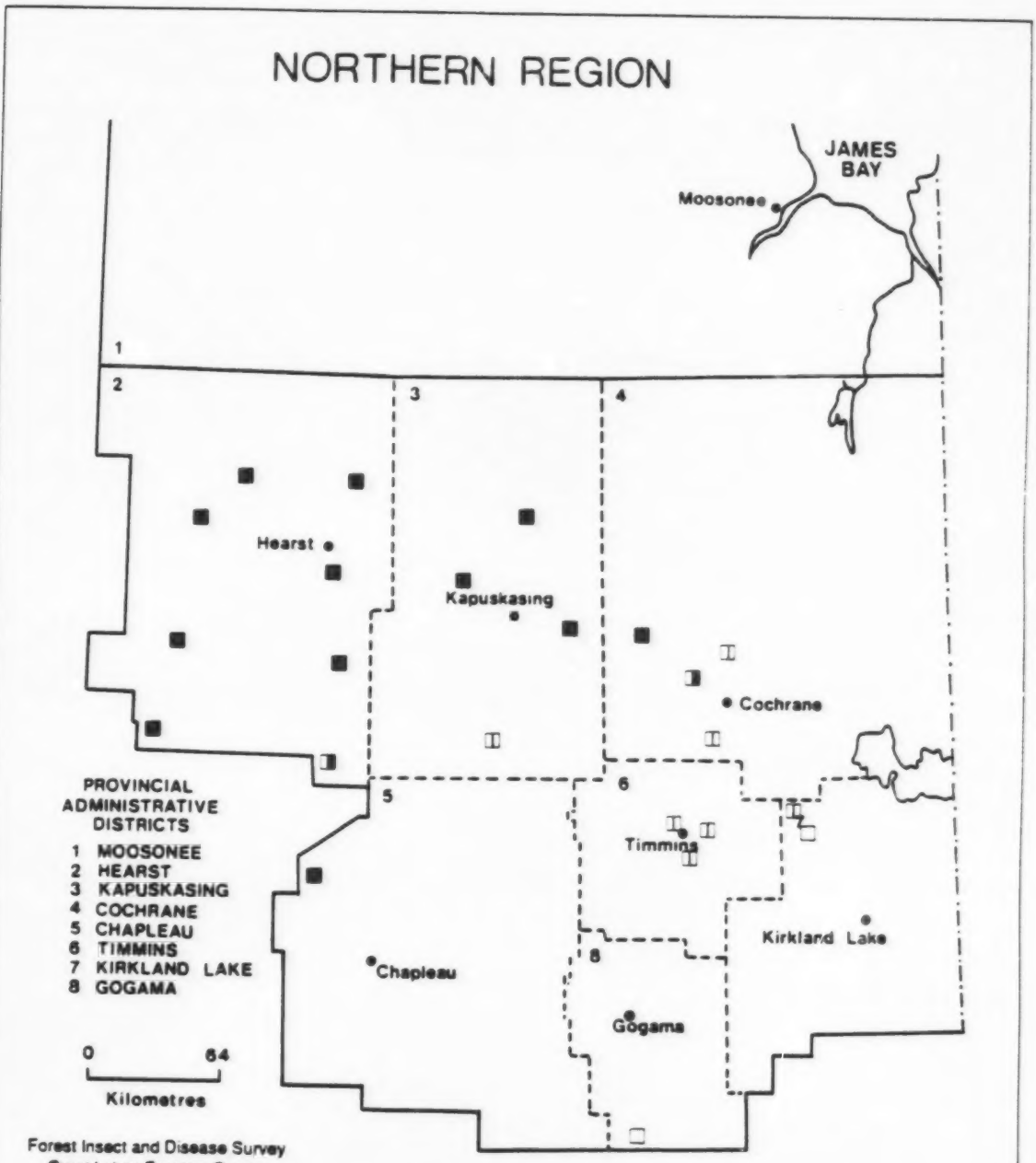


Figure 7. **Forest tent caterpillar, *Malacosoma disstria* Hbn.**

White Pine Weevil,
Pissodes strobi (Peck)

Damage to both spruce (*Picea* spp.) and pine (*Pinus* spp.) hosts remained at much the same levels as in 1990. Evaluations conducted at 50 plantations across the region revealed that an average of 6.3% of the current leaders were damaged by this insect. Above-average damage levels (10.7%) were recorded throughout Chapleau District (Table 9).

The heaviest damage levels recorded were 29.7% on 1-m black spruce at the Island Lake Tree Improvement Area in Dalmas Township, Chapleau District; 27.0% on 2.6-m white spruce in Chelsea Township, Hearst District; and 18.0% on 0.9–m jack pine in Borden Township, Chapleau District.

Table 9. Damage caused by the white pine weevil in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Tree species	Average height of trees (m)	Estimated number of trees/ha	Estimated area affected (ha)	Trees affected (%)
Chapleau District					
Birch	jP	1.0	2,500	15	5.7
Borden	jP	0.8	2,500	50	12.8
Borden	jP	0.9	2,500	50	18.0
Dalmas (Island Lake TIA[a])	jP	2.3	2,500	25	7.3
	bS	1.0	2,500	36	29.7
Delmage	jP	0.9	2,500	50	6.0
Fawn	jP	3.1	1,500	10	6.7
Keith	jP	2.4	1,500	30	7.3
Neelands	jP	2.0	2,500	5	6.0
Oates	jP	2.5	2,500	5	6.0
Reaney	jP	1.4	2,500	100	17.0
Silk	jP	0.8	2,500	75	3.3
Strom	jP	0.8	2,500	30	14.0
Warren	jP	0.8	2,500	30	7.6
Cochrane District					
Bragg	bS	2.0	2,100	200	12.7
Gladmeyer	wS	1.7	2,200	3	1.3
Raven	wS	1.7	2,100	10	18.0
Sheldon	wS	2.1	2,400	200	6.0
Thorning	bS	2.2	2,100	225	1.3
Gogama District					
Battersby	jP	0.7	4,000	500	4.6
MacMurchy	jP	1.2	1,600	30	5.6
Hearst District					
Chelsea	wS	2.6	2,000	230	22.0
Ermine	bS	1.9	2,100	150	2.0
McEwing	jP	1.5	2,100	300	1.3
Pelletier	bS	2.5	2,400	30	2.0
Stoddart	jP	2.2	2,500	3	0.7

(cont'd)

Table 9. Damage caused by the white pine weevil in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location) (concl.).

Location (Twp)	Tree species	Average height of trees (m)	Estimated number of trees/ha	Estimated area affected (ha)	Trees affected (%)
Kapuskasing District					
Fauquier	bS	0.7	2,500	9	1.3
Fauquier	bS	0.9	2,500	6	2.0
Guilfoyle	wS	2.1	2,300	245	12.7
Guilfoyle	bS	2.1	2,300	210	19.0
Hopkins	bS	1.9	2,200	100	7.3
Nansen	bS	1.2	2,100	5	2.0
Teetzel	bs	1.2	2,200	5	2.7
Kirkland Lake District					
Ben Nevis	bS	1.8	4,000	20	1.3
Ben Nevis	ws	1.3	3,333	20	1.3
Ben Nevis	jP	2.6	3,555	10	0.7
Catharine	jP	2.4	3,777	15	4.7
Chamberlain	bS	1.3	2,500	13	0.7
Chamberlain	jP	3.8	2,500	10	10.0
Egan	bS	0.6	1,500	20	1.3
Flavelle	jP	1.8	2,450	10	5.3
Kimberly	bS	0.7	2,200	20	6.7
Lawson	jP	2.1	2,500	40	8.7
Pense	jP	2.5	4,200	40	4.0
Playfair	jP	1.1	2,500	25	0.7
Pontiac	jP	1.3	4,200	25	0.7
Tyrrell	jP	9.4	2,500	20	1.3
Timmins District					
Denton	bS	0.6	2,300	5	1.3
Enid	jP	2.0	4,200	20	1.3
Macklem	jP	3.0	2,000	4	0.7

[a] Tree Improvement Area

Early Aspen Leafcurler,
Pseudexentera oregonana (Wlsm.)

A total of 147,673 ha of moderate-to-severe defoliation by this pest was aerially mapped in mature aspen (*Populus* spp.) stands across the region in 1991.

The present infestation was first recorded in the region in 1989 when a total of 15,703 ha of moderate-to-severe defoliation was recorded, primarily in the northern section of Hearst District in Fushimi and Rogers townships. Some areas of light defoliation were also reported in the Cochrane, Timmins and Kirkland Lake districts.

In 1990, forest tent caterpillar defoliation expanded into Hearst District and obscured any activity by the previously recorded leafcurler infestation in this area. Populations in the Cochrane, Timmins and Kirkland Lake districts intensified and spread northward into the Iroquois Falls to Matheson area over a total of 21,200 ha.

The current infestation, concentrated in the southern portion of Cochrane District at its junction with the Timmins and Kirkland Lake districts, has experienced a seven-fold increase this past year (Figure 8).

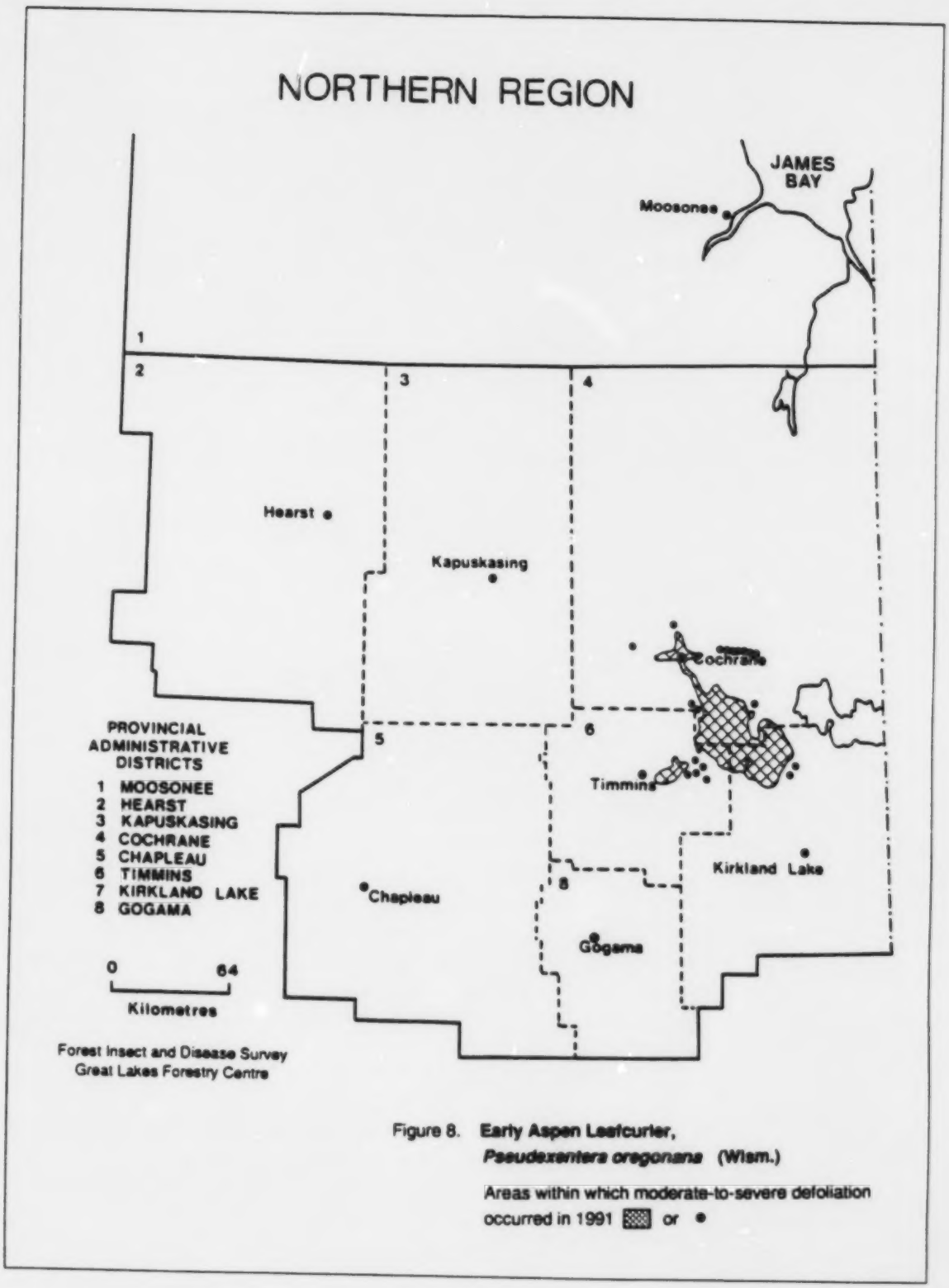


Figure 8. **Early Aspen Leafcurler, *Pseudexentera oregonana* (Wlsm.)**

Areas within which moderate-to-severe defoliation occurred in 1991 ▩ or ●

The main body of moderate-to-severe (80–100%) defoliation is concentrated along Highway 11 in a 20-km-wide corridor from Iroquois Falls in Cochrane District to Ramore in Kirkland Lake District. To the west of this main body, a large area of defoliation was recorded between Schumacher and Night Hawk Centre, primarily along Highway 101.

Another corridor of damage extends northward out of the main body in an approximately 2-km-wide strip along Highway 11 into the Cochrane–Lillabelle Lake area and west into the Deception Lake area. East of the Cochrane infestation, a long, narrow area of defoliation was recorded along Highway 652 from the Sucker River east to the Low Bush River on the Trans–Limit Road of Abitibi Price.

Adjacent to these main bodies of infestation, numerous pockets of severe defoliation were recorded over areas of up to 200 ha in size.

In Chapleau District, population levels of another aspen leafcurler, the large aspen tortrix (*Choristoneura conflictana* [Wlk.]), were generally low; however, 60 to 70% defoliation was recorded in Chapleau Township on mature aspen forest over a 3-ha area.

Minor Insects

Jack Pine Tip Beetle, *Conophthorus resinosae* Hopk.

A further decline in the population levels of this beetle has taken place across the entire region. Low levels of damage occurred in a 50-ha plantation in Chamberlain Township in Kirkland Lake District, where 10% of the 3.8-m trees were affected. Numerous evaluations across the rest of the region revealed an average of one to four shoots per tree attacked on 0.7 to 2.7% of the trees, ranging in size from 1.1 to 3.5 m in height.

One exception, however, occurred in a small, isolated 0.5-ha plantation in Foleyet Township, Chapleau District, where 100% of the 1.5-m trees had 50% of their shoots affected.

American Aspen Beetle, *Gonioctena americana* (Schaeff.)

In the past, damage by this insect was restricted to regeneration of trembling aspen growing in cutover areas or mixed with young coniferous plantations. However, moderate defoliation was recorded in 1991 on trees up to 10 m tall growing in natural stands in Chapleau District. In a 3-ha stand in Deans Township, Chapleau District, 100% of the 8-m trees were attacked, with an average defoliation level of 60%. In a 5-ha stand in Chappise Township, Chapleau District, similar defoliation occurred on 9-m trees. Similar damage was observed in scattered smaller stands throughout the district.

In 1991, defoliation was again heavy in the expected susceptible areas, on young aspen growing in open cutovers and in open areas such as parks.

Northern Pitch Twig Moth, *Petrova albicapitana* (Bsk.)

Levels of damage caused by this moth have increased substantially across the entire region. The heaviest damage occurred in Kennedy Township, Cochrane District, where evaluations were conducted in two similar 1-ha plantations with 2-m trees; in one, 65% of the trees were affected, with 33% of the main stems attacked, whereas 50% of the trees were affected in the other, with 35% of the main stems attacked (Table 10). In a 10-ha plantation in Ossian Township, Kirkland Lake District, 46% of the trees were attacked, with 22% experiencing main-stem damage. In a 15-ha plantation in Foleyet Township, Chapleau District, 34% of the trees were affected, with 29% of the nodules on the leaders.

Trees are not usually killed by this type of insect damage, but serious stem deformity will result, causing a loss of quality before harvesting.

Table 10. Damage by the northern pitch twig moth in five districts of the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected jack pine trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	
				Total	Main stem
Chapleau District					
Delmage	1.0	2,500	25	1.0	1.0
Foleyet	1.5	2,000	15	34.0	29.0
Horwood	1.0	3,000	10	4.0	4.0
McNaught	0.5	4,000	50	20.0	20.0
Reaney	1.0	2,500	50	1.0	1.0
Cochrane District					
Findlay	1.0	2,000	25	14.0	12.7
Kennedy	2.1	2,500	1	50.0	35.0
Kennedy	2.0	2,400	1	65.0	33.0
Kennedy[a]	1.3	2,400	1	15.3	12.0
Mortimer	2.4	2,500	30	7.3	2.0
Gogama District					
Noble	7.0	500	5	25.0	0
Hearst District					
Arnott	3.4	2,500	20	0.7	0
Chelsea	2.8	2,100	20	6.7	6.0
Mewhinney	3.1	2,100	15	0.7	0
Stoddart	2.2	2,500	3	10.0	6.7
Kirkland Lake District					
Chamberlain	3.8	2,500	10	7.3	0
Flavelle	1.8	2,450	12	12.7	11.3
Ossian	1.2	2,500	10	46.0	22.0
Playfair	1.1	2,500	10	28.0	22.7
Timmins District					
Denton	0.8	2,100	20	4.7	2.7
Evelyn	1.0	2,500	25	20.7	17.3
Macklem	3.0	2,000	12	20.0	7.3

[a] Scots pine (*Pinus sylvestris* L.) at this one location.

Table 11. Other forest insects.

Insect	Host(s)	Remarks
Acleris variana (Fern.) Eastern blackheaded budworm	bS	This insect was recorded causing trace levels of defoliation on 0.7% of the 1.2-m trees in a 5-ha plantation, Nansen Twp, Kapuskasing District.
Aphrophora cribrata (Wlk.) Pine spittlebug	jP	Increased populations of this insect occurred across the northern districts of the region. One to four spittle masses per tree occurred on 63.3% of the 3.4-m trees in a 20-ha plantation, Arnott Twp, Hearst District. A general population decrease was observed across the southeastern districts of the region. In a 5-ha plantation in Denton Twp, Timmins District, 11.3% of the 1-m trees had an average of two spittle masses per tree.

(cont'd)

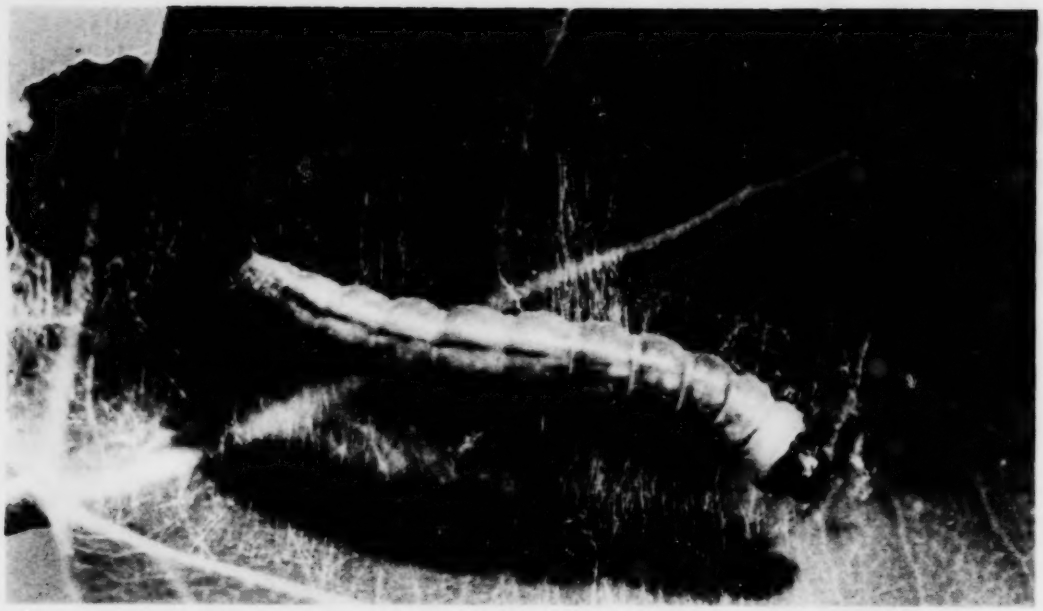
Table 11. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Arge pectoralis (Leach) Birch sawfly	wB	Semimature trees growing along the lakeshore in Ivanhoe Lake Prov. Park, Chapleau District, were 100% affected, with an average of 7% defoliation.
Archips cerasivorana (Fitch) Uglynest caterpillar	cC	Damage generally decreased across the region. A 6-ha field in Cavell Twp, Chapleau District, had 45% defoliation on open-growing trees, compared with 75% in 1990. Single-colony infestations were common at widely scattered locations across the region.
Coleophora laricella (Hbn.) Larch casebearer	tL	This insect was commonly found in small numbers across the southern half of the region. The heaviest damage observed was 15% defoliation in Evanturel Twp, Kirkland Lake District. In Cosens Twp, Chapleau District, 13% of the shoots were attacked in a 2-ha stand of mature trees.
Epinotia aceriella (Clem.) Maple trumpet skeletonizer	sM	This insect caused 10% defoliation of mature trees growing on hilltops in the Flame Lake area, Deans Twp, Chapleau District.
Eriophyes elongatus Hodg. A gall mite	sM	100% of the regeneration growing in a 5-ha area in Deans Twp, Chapleau District, had 75% of its foliage damaged.
Eupareophora parca (Cress.) Spiny ash sawfly	bAs	Damage was widespread in the Chapleau and Gogama districts. The largest populations were observed in 10- and 15-ha stands in Ivanhoe and Carty twps, Chapleau District, where defoliation levels of 30 and 35%, respectively, were recorded.
Gonioctena notmani (Schaeff.) Willow leaf beetle	w	One species of willow (*Salix* spp.) growing in a 50-ha area in Wakami Lake Prov. Park, Chapleau District, was attacked; 100% of the shrubs were attacked, with an average of 65% defoliation.
Hyphantria cunea (Drury) Fall webworm	pCh	Trace population levels were observed through the Timmins and Kirkland Lake districts. Roadside shrubs and those at the edges of fields supported several colonies per tree in pockets of less than 0.1 ha in the Thornloe farming area, Kirkland Lake District.
Macrohaltica ambiens (Lec.) Alder flea beetle	Al	Complete defoliation was common in and around the town of Elk Lake, Kirkland Lake District. Defoliation levels of up to 90% were recorded in widely scattered pockets in Kennedy Twp, Cochrane District. Lesser degrees of defoliation occurred across the eastern half of the region.
Malacosoma californicum pluviale (Dyar) Northern tent caterpillar	deciduous	For the second consecutive year, populations declined in the Chapleau and Gogama districts. The heaviest damage occurred in Battersby Twp, Gogama District, where an average of 5 to 6 tents per 100 m of roadway was recorded.
Micurapteryx salicifoliella (Cham.) Willow leafminer	w	Severe defoliation (up to 100%) occurred along Hwy 11 from the town of Hearst, Hearst District, west to the Geraldton District boundary.
Neodiprion maurus Roh. A pine sawfly	jP	Trace levels of defoliation were recorded on 0.7-m trees in Ossian Twp, Kirkland Lake District.

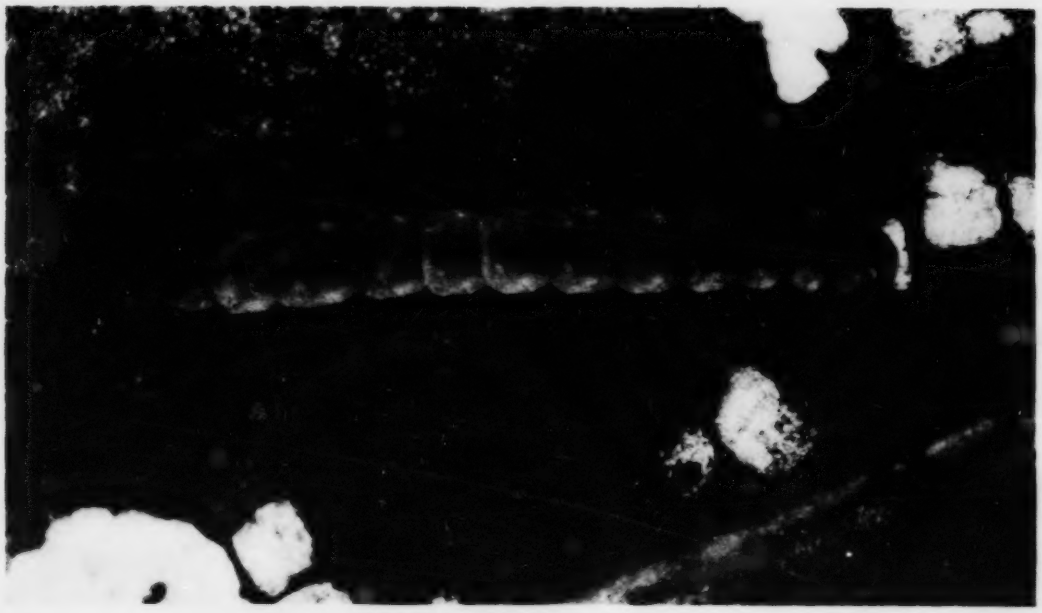
(cont'd)

Table 11. Other forest insects (concl.).

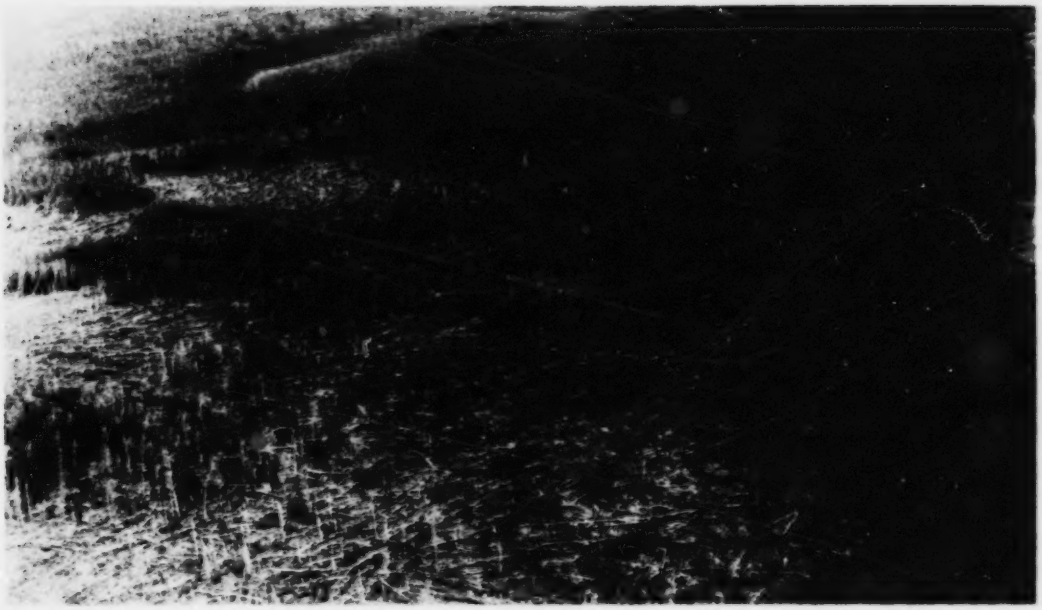
Insect	Host(s)	Remarks
Phyllonorycter nipigon (Free.) Balsam poplar leafblotch miner	bPo	Severe defoliation occurred in 22 ha of mature balsam poplar (*Populus balsamifera* L.) in Robillard and Dack twps, Kirkland Lake District. Severe defoliation (up to 90%) was reported in scattered mature 2- to 5-ha stands in Wicksteed Twp, Hearst District. In St. John Twp, Cochrane District, 20% defoliation was recorded.
Pristiphora geniculata (Htg.) Mountain–ash sawfly	AMo	Low population levels were commonly observed through portions of the Chapleau, Hearst and Gogama districts. Heavy (65–75%) defoliation was observed in the Guil[illegible]e Lake area, Kapuskasing District, and in Ivanhoe Lake Prov. [illegible], Chapleau District. Similar damage was found on many ornamental trees growing in the town of Chapleau.
Prociphilus tessellatus (Fitch) Woolly alder aphid	Al	Alder clumps ranging in size from 0.1 to 0.5 ha were affected at widely scattered points across the entire region. In Deans Twp, Chapleau District, 100% of the 2- to 4-m shrubs were affected.
Pyrrhia exprimens (Wlk.) Variable caterpillar	ground vegetation	The insect was commonly found in the area of an extensive 1991 spring wildfire in northern Gogama District. During mid-summer, numerous larvae were observed feeding on new ground cover and young shrubs. Defoliation levels were in the 45–55% range.
Rhabdophaga swainei Felt Spruce bud midge	bS	Light damage was recorded on 10% of the 1.2-m trees in a 5-ha plantation in Nansen Twp, Kapuskasing District. At a seed orchard in Chamberlain Twp, Kirkland Lake District, 7.3% of the 1-m trees were affected. Trace levels of damage were observed across the rest of the region.
Rheumaptera hastata (L.) Spearmarked black moth	wB	Defoliation doubled (to 10%) in a mature experimental stand along the Detour Lake Road, Cochrane District.
Rhyaciona adana Heinr. Pine tip moth	jP	Trace-to-light (1–5%) tip mortality was recorded on 1-m trees in three family test areas. In Timmins District, the percentage of hosts affected ranged from 8% in Evelyn Twp to 27.3% in Denton Twp. In Kirkland Lake District, 18% of the trees were affected in Ossian Twp.
Toumeyella parvicornis (Ckll.) Pine tortoise scale	jP	Most (80–100%) trees were affected in young plantations in Burt Twp, Kirkland Lake District.
Zelleria haimbachi Bsk. Pine needle sheathminer	jP	Widely scattered 0.8-m trees had up to 70% foliar damage in Evelyn Twp, Timmins District.



Larva of the early aspen leafcurler (*Pseudexentera oregonana* [Wlsm.]).

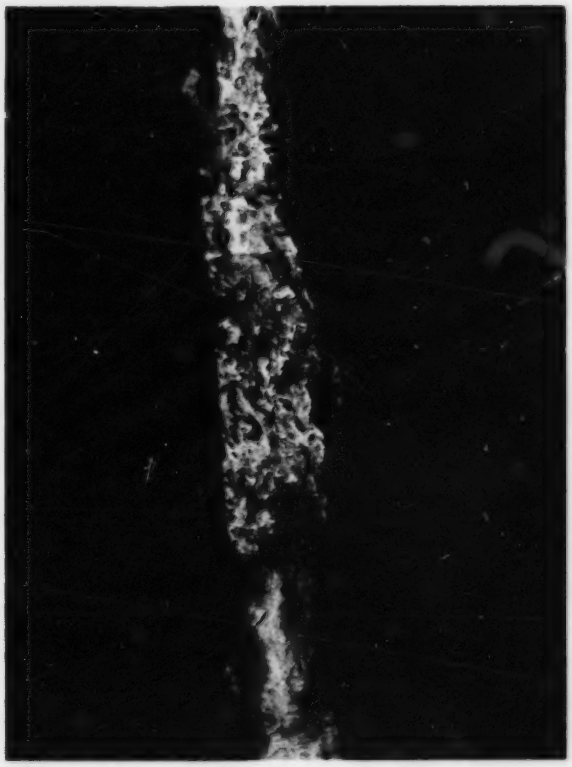


Larva of the birch skeletonizer (*Bucculatrix canadensisella* Cham.).



Blowdown damage in lowlying black spruce (*Picea mariana* [Mill.] B.S.P.) forest.

Fruiting body of western gall rust (*Endocronartium harknessi* [J.P. Moore] Y. Hirats.).



Fruiting body of sweetfern blister rust (*Cronartium comptoniae* Arthur).

TREE DISEASES

Major Diseases

Armillaria Root Rot,
Armillaria ostoyae (Romagn.) Herink

An average mortality level of 1.6% was recorded in the 23 spruce and pine plantations examined across the region in 1991. The heaviest damage occurred in small pockets of trees in plantations across the Hearst, Cochrane and Chapleau districts (Table 12). The heaviest mortality (6%) was recorded in a 300-ha jack pine plantation of 1.5-m trees in McEwing Township, Hearst District. Trace levels of mortality were also recorded in spruce plantations throughout the region.

Spruce Needle Rusts,
Chrysomyxa ledi (Alb. & Schwein.) de Bary var. *ledi* and *Chrysomyxa ledicola* (Peck) Lagerh.

An increase in infection levels occurred in Chapleau District. Seven townships near the central portion of the district were evaluated, and 100% of the trees in each were infected, with foliar damage ranging from 5 to 70%. The heaviest damage was recorded in Coppell and Hoey townships. At the Chapleau Tree Nursery, 100% of the scattered young spruce surrounding the nursery were affected, with 55% foliar damage. However, no damage was found on the growing stock.

Table 12. Jack pine mortality caused by Armillaria root rot in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Current mortality (%)
Chapleau District				
Birch	0.8	2,500	10	1.0
Delmage	1.0	2,500	25	2.0
Ivy	0.7	2,500	10	2.0
Nimitz	1.7	2,500	130	1.0
Reaney	0.4	2,500	50	3.0
Strom	0.5	2,500	30	4.0
Cochrane District				
Kennedy	1.5	2,400	2	4.7
Hearst District				
Chelsea	2.8	2,100	20	0.7
Elgie	1.1	2,500	250	0.7
McEwing	2.4	2,500	1	0.7
McEwing	1.5	2,100	300	6.0
Stoddart	2.2	2,500	3	0.7
Kirkland Lake District				
Ben Nevis	2.6	3,600	20	0.7
Catharine	2.4	3,800	15	0.7
Flavelle	1.8	2,500	20	1.3
Ossian	1.2	2,500	20	0.7
Pense	2.5	4,200	40	0.7
Playfair	1.1	2,500	25	0.7
Pontiac	1.3	4,200	25	0.7
Tyrrell	0.9	3,500	24	0.7
Timmins District				
Denton	1.0	2,200	30	0.7
Enid	1.4	4,200	20	2.1
Evelyn	0.8	2,200	25	1.3

Infection levels of these needle rusts remained high across the Kapuskasing and Cochrane districts. Even though the infection levels were commonly at 100%, the percentage of actual damage per tree (1 to 29%) was low. The most damage occurred in Kennedy Township, Cochrane District (Table 13). Trace-to-low infection levels were recorded throughout the remainder of the region.

A parasitic fungus associated with this rust was only found in the Hearst, Kapuskasing and Cochrane districts, in the heaviest of the infected areas. Four plantations have been monitored for the past 3 years, two in Bragg Township and one in Thorning Township in Cochrane District, and one in Hopkins Township in Kapuskasing District. Evaluations have provided some evidence that as levels of the parasitic fungus increase, levels of the rust fungus decrease (Table 14).

Pine Needle Rust,
Coleosporium asterum (Dietel) Sydow

The incidence of this disease increased slightly compared with the previous 2 years. Light damage was observed in the majority of jack pine plantations surveyed. The heaviest damage occurred in Alcona Township, Chapleau District, where 100% of the 1-m trees in a 100-ha plantation were affected, with an average of 20% foliar damage (Table 15).

Table 13. Damage caused by spruce needle rusts in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Tree species	Average height of trees (m)	Estimated number of trees/ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
Chapleau District						
Coppell	bS	3.0	1,500	5	100	70
Gilliland	wS	2.5	2,500	30	100	5
Hoey	bS	2.0	1,500	15	100	60
Keith	wS	2.0	2,500	25	100	5
Lipsett	wS	2.0	2,500	200	100	5
Reaney	bS	2.5	1,500	3	100	35
Sandy	bS	2.0	1,500	5	100	35
Cochrane District						
Bragg	bS[a]	2.0	2,100	225	100	2
Kennedy	bS[a]	0.8	2,500	2	99	29
Mann	bS	0.3	2,500	5	13	2
Raven	wS[a]	1.7	2,100	10	23	2
Sheldon	wS[a]	2.1	2,400	200	1	2
Thorning	bS[a]	2.2	2,100	225	99	5
Tweed	bS	0.3	2,300	5	1	2
Hearst District						
Pelletier	bS	2.5	2,400	30	49	2
Stoddart	bS	0.7	2,500	5	1	2
Kapuskasing District						
Fauquier	bS	0.7	2,500	9	57	2
Fauquier	bS	0.9	2,500	6	61	2
Guilfoyle	wS	2.1	2,300	200	1	2
Hopkins	bS[a]	1.9	2,200	100	100	2
Nansen	bS	1.2	2,100	5	19	2
Teetzel	bS	1.2	2,200	5	17	2

[a] At this location, the parasitic fungus was also found.

Table 14. A 3-year comparison of three areas with a heavy incidence of spruce needle rust that have also been affected by a parasitic fungus.

Location (Twp)	Trees affected (%)			Foliar damage (%)			Trees with the parasitic fungus (%)		
	1989	1990	1991	1989	1990	1991	1989	1990	1991
Cochrane District									
Bragg	100	99	100	25	15	2	8	99	100
Thorning	100	100	100	22	2	5	95	0	90
Kapuskasing District									
Hopkins	100	100	100	17	16	2	67	99	100

Table 15. Damage caused by pine needle rust to jack pine in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
Chapleau District					
Alcona	1.0	2,500	25	100	20
Bernier	0.5	2,500	30	81	5
Birch	0.8	4,400	10	76	5
Bonar	0.3	4,400	200	100	14
Borden	1.0	2,400	25	50	5
Foleyet	1.5	2,000	15	100	14
Hill	1.0	2,500	100	99	20
Horwood	1.0	2,000	12	80	15
Nimitz	1.7	2,500	130	75	20
Paul	0.3	4,400	75	60	27
Reaney	0.4	2,400	50	63	20
Topham	0.9	2,500	5	90	20
Warren	0.5	4,400	100	75	33
Cochrane District					
Mewhinney	3.1	2,000	15	99	3
Gogama District					
Battersby	0.5	4,400	500	99	10
MacMurchy	1.0	2,500	50	100	16
Hearst District					
Arnott	3.4	2,500	20	43	2
Chelsea	2.8	2,100	20	99	12
Elgie	1.1	2,500	250	9	2
McEwing	2.4	2,500	1	97	1
Kirkland Lake District					
Burt	2.3	2,100	3	12	5
Chamberlain	3.8	2,500	10	64	9
Ossian	1.2	2,500	25	45	6
Playfair	1.1	2,500	15	0	0
Timmins District					
Denton	1.0	2,500	20	23	4
Macklem	3.0	2,000	25	2	1

This needle rust requires an alternate host to complete its life cycle. Jack pine is the primary host, and aster (*Aster* spp.) and goldenrod (*Solidago* spp.) are the alternate hosts. This rust disease causes premature loss of the previous year's foliage, retarding a young tree's development.

Sweetfern Blister Rust,
Cronartium comptoniae Arthur

The overall levels of incidence and percentage of trees severely damaged by main-stem infections were up marginally over levels recorded in previous years. As has been the case in the previous 2 years, the heaviest area of damage was in Hutcheon Township, Chapleau District. At this location, 12% of the 1.9-m trees were affected (10.7% with main-stem infections) over an area of 25 ha (Table 16).

Surveys of mature trees in Wakami Lake Provincial Park in Neelands Township, Chapleau District, revealed that an average of 11.6% of the trees examined over the 20-ha area had old infections at the base of the trees. Branch infections were commonly recorded at trace levels during plantation evaluations in much of the remainder of the region.

White Pine Blister Rust,
Cronartium ribicola J.C. Fischer

Eastern white pine (*Pinus strobus* L.) natural regeneration ranging in height from 1 to 5 m sustained an average infection level of 12% at nine areas evaluated across the Chapleau, Cochrane and Gogama districts. The heaviest damage was recorded over a 0.5-ha area of 1.5-m trees in Cosens Township, Chapleau District. At this location, 37% of the young trees showed signs of the rust (Table 17).

Tar Spot Needle Cast,
Davisomycella ampla (J. Davis) Darker

In Northern Region in 1991, there was a low incidence of this disease in many of the plantations surveyed. However, there were a few areas of moderate infection. The heaviest damage occurred in a 15-ha plantation in Invergarry Township, Gogama District, where 99% of the 1-m trees were infected, with an average of 40% foliar damage (Table 18).

Table 16. Damage caused by sweetfern blister rust in jack pine plantations in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Trees severely affected (%)
Chapleau District					
Alcona	1.5	2,500	10	4.7	3.0
Birch	0.8	4,400	10	3.0	2.0
DeGaulle	1.5	1,500	15	9.6	6.7
Delmage	1.0	2,500	25	1.3	0.7
Hutcheon	1.9	1,600	25	12.0	10.7
Ivy	0.7	2,500	10	3.0	2.0
Neelands	13.0	800	20	11.6	11.6
Strom	0.5	2,500	30	2.0	1.3
Gogama District					
Invergarry	1.0	2,500	15	3.0	2.0
Invergarry	1.5	2,500	25	5.0	4.0
Hearst District					
Arnott	3.4	2,500	20	1.3	1.3

This early-season foliar disease of jack pine causes discoloration and premature drop of the previous year's foliage. During mid-spring, the fruiting bodies of this pathogen are produced on the 1-year-old needles. When the fruiting body matures, spores are discharged in wet weather and infect the current year's foliage. After infecting the current year's growth, the previous year's foliage is shed. During the year, the fungus develops in the newly infected foliage and the cycle continues the following spring.

Table 17. Damage caused by white pine blister rust to young white pine in the Northern Region of Ontario in 1991.

Location (Twp)	Average height of trees (m)	Number of trees examined	Number of trees affected	Trees affected (%)
Chapleau District				
Cortez	1.2	40	7	18
Cosens	1.0	35	13	37
Fitzsimmons	1.0	25	1	4
Gilliland	1.1	30	2	7
Green	0.8	35	4	11
Ivy	1.0	40	2	5
Kalen	1.0	25	5	20
Cochrane District				
Duff	4.0	100	2	2
Gogama District				
Hazen	1.1	30	4	13

Table 18. Damage caused by tar spot needle cast in jack pine plantations in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Trees affected (%)	Foliar damage (%)
Chapleau District					
Alcona	1.0	2,500	10	34	10
Copperfield	1.6	2,500	25	18	27
Delmage	1.0	2,500	25	3	1
Foleyet	1.5	500	1	100	30
Hutcheon	1.9	1,500	25	20	35
Ivy	1.5	2,500	10	10	20
Nimitz	1.7	2,500	130	25	35
Oates	1.5	2,500	15	30	25
Reaney	0.5	2,500	50	15	35
Strom	0.5	2,500	30	15	35
Gogama District					
Battersby	2.0	1,500	500	90	40
Invergarry	1.0	2,500	15	99	40
Invergarry	1.5	2,500	25	35	25
MacMurchy	1.0	2,500	50	14	25
Hearst District					
Arnott	3.4	2,500	20	1	15
Kirkland Lake District					
Chamberlain	3.8	2,500	10	14	7
Ossian	1.2	2,500	20	14	13
Playfair	1.1	2,500	20	1	5
Timmins District					
Denton	1.0	2,500	20	6	20
Macklem	3.0	2,000	20	20	3

Western Gall Rust,
Endocronartium harknessii (J.P. Moore) Y. Hirats.

Infection levels remained much the same as in 1990 at the 20 plantations across the region evaluated for this organism. The heaviest damage was recorded over a 15-ha plantation in Birch Township, Chapleau District. At this location, 34% of the 0.8-m jack pine trees were infected with galls (32% of which were main-stem infections) (Table 19).

Severe main-stem infections have been responsible for tree mortality, primarily in the 1–2% range, in the stands evaluated in the past few years. However, plantations in Copperfield Township, Chapleau District, and MacMurchy Township, Gogama District, are currently showing recent mortality figures of 14 and 8%, respectively.

Scleroderris Canker,
Gremmeniella abietina (Lagerb.) Morelet

In 1990, a 2-ha area of Scleroderris canker damage was found in a 200-ha jack pine plantation in Reaney Township, Chapleau District. In this area, 78% of the trees were affected. Concern about this disease prompted OMNR to conduct a sanitation cut and burn operation during July 1990. During 1991, this area was checked monthly to detect any continuing presence of the organism. Checks to date have proven negative, but continued monitoring of the situation is planned.

Table 19. Damage caused by western gall rust in jack pine plantations in the Northern Region of Ontario in 1991 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Average height of trees (m)	Estimated number of trees per ha	Estimated area affected (ha)	Tree affected (%)	Trees severely affected (%)
Chapleau District					
Alcona	1.0	2,500	10	10	0
Birch	0.8	2,500	15	34	32
Borden	1.0	2,500	10	2	2
Copperfield	1.6	2,000	225	8	8
Delmage	1.0	2,500	25	1	0
Hill	1.0	2,500	100	0	0
Hutcheon	1.9	1,600	25	9	1
Ivy	0.7	2,500	20	1	1
McNaught	0.5	2,500	125	0	0
Nimitz	1.8	2,000	130	9	3
Reaney	0.5	4,400	50	3	1
Strom	0.5	6,000	30	1	1
Cochrane District					
Mewhinney	3.1	2,000	15	1	1
Gogama District					
Battersby	0.5	4,400	500	4	4
MacMurchy	1.0	2,500	50	20	20
Hearst District					
Elgie	1.1	2,500	15	1	0
Kirkland Lake District					
Ben Nevis	2.6	3,500	25	4	3
Tyrrell	0.9	3,500	25	1	1
Timmins District					
Denton	1.0	2,500	25	1	1
Macklem	3.0	2,000	4	3	1

One new infection center was reported in Skead Township, Kirkland Lake District. At this location, 2% of the 2.3-m trees in a 5-ha area were infected.

Minor Diseases

Linospora leaf blight,
Linospora tetraspora G.E. Thompson

Early in August 1991, the foliage of balsam poplar across the region became discolored, and early leaf fall occurred by the latter half of the month. By early September, affected trees were nearly completely defoliated. This condition was caused by Linospora leaf blight.

Across the entire region, nearly all available host trees were affected to some degree. Damage tended to be most severe in low, wet areas, where 100% of the trees were usually attacked, with 100% of the foliage affected. This occurrence represents the first severe damage reported in the region since 1987.

Table 20. Other forest diseases.

Organism	Host(s)	Remarks
Chrysomyxa pirolata (Körn.) Winter Spruce cone rust	bS	This organism was responsible for damage to approximately 1% of the cones on 2.2-m black spruce trees throughout a 200-ha plantation in Thorning Township, Cochrane District.
Ciborina whetzelii (Seaver) Seaver Ink spot of aspen	tA	Incidence of this disease decreased greatly in 1991. The heaviest damage was recorded in Macklem Township, Timmins District, where 20 to 25% defoliation was recorded in several young 4-m aspen stands over areas up to 1 ha in size.
Inonotus tomentosus (Fr.) Teng Tomentosus root rot	jP	This root rot damaged mature jack pine stands in Larkin Township, Hearst District. The trees, already under stress from drought conditions, sustained heavy blowdown damage during high winds in late June.
Isthmiella faullii (Darker) Darker Isthmiella needle cast	bF	This needle-cast fungus was responsible for an average of 10% defoliation of the old needles, primarily on the lower portions of 1-m trees over a 1-ha area in Reaney Township, Chapleau District, and 8.5-m trees over a 0.5-ha area in McEvay Township, Kirkland Lake District.
Lirula nervata (Darker) Darker Lirula needle cast	bF	Moderate (40–80%) defoliation by this organism was recorded on 3-m trees over a 0.5-ha area of regeneration along Graham's Creek in Ingram Township, Kirkland Lake District. The heaviest damage occurred consistently on the lower third of the crowns.
Melampsora medusa Thüm. Larch–poplar rust	tL	This needle rust was generally found at low levels throughout the Timmins, Kirkland Lake and Cochrane districts. The heaviest damage occurred over a 1-ha plantation of 1.3-m trees in Kennedy Township, Cochrane District, where 100% of the trees were affected, with an average of 7.3% defoliation.
Mycosphaerella populicola G.E. Thompson Septoria leaf spot	tA	This leaf-spot organism damaged 70% of the foliage of mature aspen trees in 5-ha pockets in St. John Township, Cochrane District, and Wicksteed Township, Hearst District.

(cont'd)

Table 20. Other forest diseases (concl.).

Organism	Host(s)	Remarks
Pucciniastrum epilobii Otth Fir–fireweed rust	bF	Young 2-m balsam fir (*Abies balsamea* [L.] Mill.) regeneration sustained an average of 10% defoliation over areas of up to 2-ha throughout the Kapuskasing, Cochrane and Timmins districts. The heaviest damage occurred over a 1-ha area in Dupuis Township, Chapleau District, where host trees sustained an average of 40% defoliation.
Rhizophaera pini (Corda) Maubl. Needle blight	bF	Lower branch mortality occurred on semimature balsam fir in Cosens and Borden townships, Chapleau District. In both cases, the death of the branches was attributed to this needle blight.
Septoria betulae Pass. Septoria leaf blight	wB	Low (5–15%) damage levels were observed on white birch foliage throughout the Timmins and Kirkland Lake districts and across the southern portion of Hearst District. Heavier (60–90%) damage was recorded in smaller areas in Derry Township, Hearst District, and Clifford and Katrine townships, Kirkland Lake District. Light damage was encountered at various other points across the region.
Venturia macularis (Fr.:Fr.) E. Müller & v. Arx. Shoot blight	tA	Trembling aspen commonly exhibited infection levels of 20%, with damage levels of 10 to 15% in cutover areas in Chelsea and Elgie townships, Hearst District. This organism occurred over large areas on natural regeneration between 0.5 and 3 m in height.
Venturia populina (Vuill.) Fabricius Shoot blight	bPo	Balsam poplar regeneration averaging 1 m in height sustained damage to 90% of the new shoots throughout a 0.5-ha area in Nimitz Township, Chapleau District.

ABIOTIC CONDITIONS

Blowdown Damage

Severe thunderstorms accompanied by high winds passed through much of the region on 17 June 1991. As a result of this storm, 49,399 ha of damaged forests were aerially mapped at scattered locations throughout much of the region (Table 21, Fig. 9).

Table 21. Blowdown damage in the Northern Region of Ontario in 1991.

District	Area damaged (ha)
Chapleau	5,590
Cochrane	13,910
Gogama	1,300
Kapuskasing	15,855
Kirkland Lake	5,350
Timmins	7,394
Total	49,399

Damage was not confined to any particular tree species, but generally occurred in 1- to 5-ha patches so close together that they gave the appearance of continual damage. Although damage was widespread, it seemed to occur more frequently along the edges of cutovers, in low, swampy areas, along rivers and lakeshores and on west-facing hillsides.

Throughout cutover areas, many residual birch and aspen trees were broken off at the 3- to 5-m level, whereas the trees damaged along the edge of the cutovers were more or less flattened, and lay in a northwesterly direction.

Drought

Below-normal precipitation and above-average temperatures were experienced across the region for the second consecutive year, resulting in widespread drought conditions in 1991 (Table 22, Fig. 10).

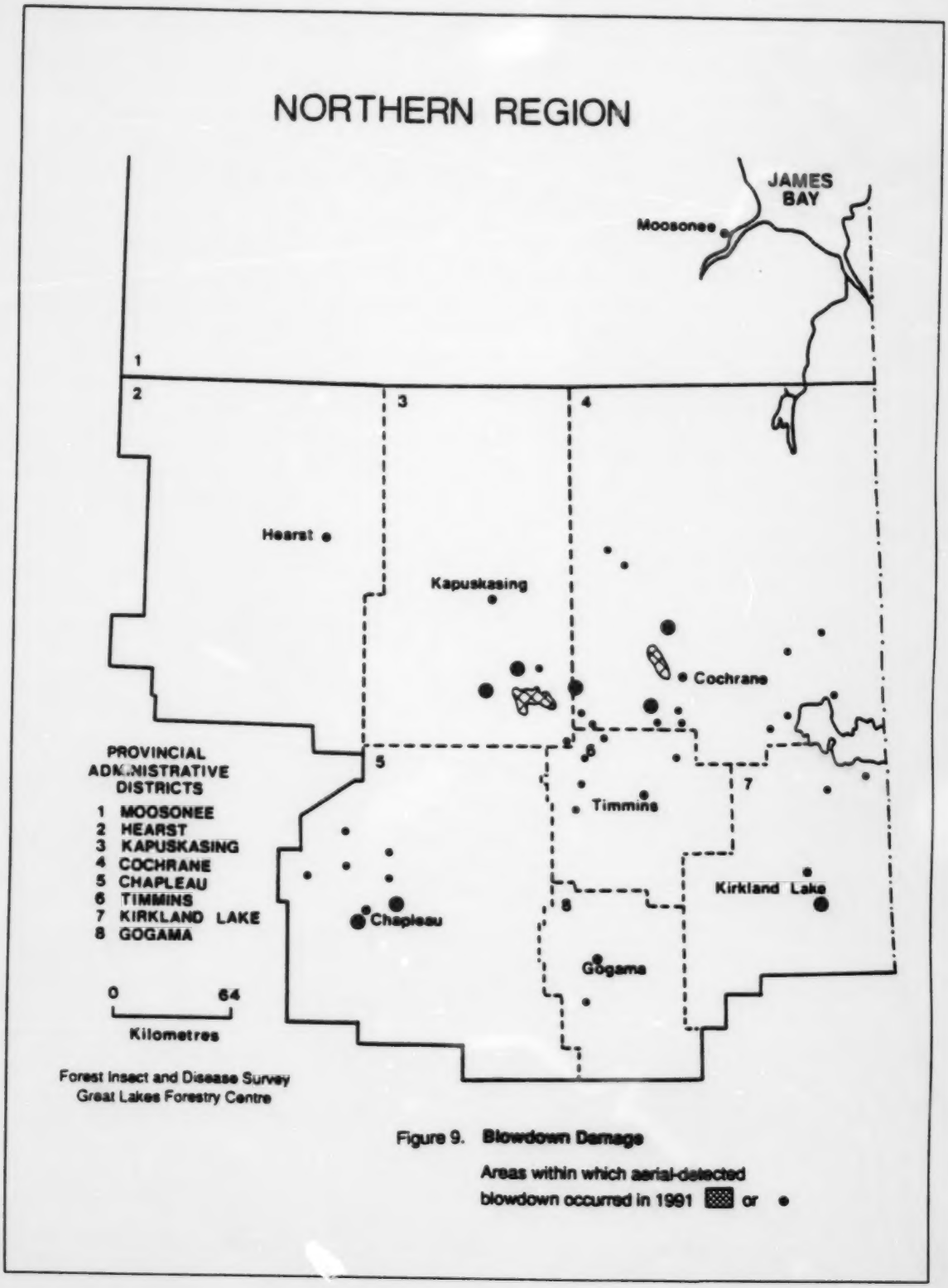


Figure 9. **Blowdown Damage**

Areas within which aerial-detected blowdown occurred in 1991 ▩ or ●

Table 22. Areas of the Northern Region of Ontario in which drought-induced loss of foliage was recorded in 1991.

District	Total area affected (ha)
Chapleau	3,000
Cochrane	65,268
Gogama	600
Hearst	125,877
Kapuskasing	41,985
Kirkland Lake	400
Moosonee	200
Total	237,303

Damage recorded was, in most cases, in the form of foliar discoloration and premature leaf fall, and was predominantly confined to coarse, well-drained, gravelly sites and rocky (shallow-soil) outcrops. Throughout these sites, white birch and jack pine were the main species affected.

In the area of heavy foliar damage caused by the forest tent caterpillar in the Hearst and Kapuskasing areas, many of the trees that were completely defoliated were exposed to very dry, warm temperatures during periods of attempted refoliation. In many instances, small secondary leaves dried quickly and died or the trees failed in the attempted refoliation.

The effects of drought conditions throughout much of the region were extremely hard to determine on white birch because of the presence of both Septoria leaf spot and the birch leaf skeletonizer; in some stages of development, these pests caused symptoms similar to those of drought.

Frost Damage

A light frost in early May was responsible for damage to coniferous plantations at widely scattered locations across the northern and north-eastern portions of the region. Most of the damage was confined to lowlying areas of black spruce, white spruce and balsam fir.

The heaviest damage recorded was 15% foliar damage on 66% of the 0.6-m black spruce in Denton Township, Timmins District. On 15.3% of the trees, new shoots on the upper third of the tree were completely destroyed. In Raven Township, Cochrane District, 100% of the 1.7-m-tall white spruce trees had 10% of their new shoots damaged. Trace levels of affected foliage were observed in young plantations across much of the above-mentioned portions of the region.

Herbicide Injury

The application of a herbicide spray (Vision®) to four black spruce family-test sites in Cochrane District resulted in foliar damage and some mortality of the spruce growing stock. The plantations evaluated in Tweed, Teefy, Mewhinney and Mann townships averaged 5 ha in size and the trees averaged 0.3 m in height. An average of 48.3% of the trees were affected, with an average of 24% defoliation; the average mortality rate was 16%, with a low of 0% in Mewhinney Township and a high of 28% in Mann Township.

Salt Injury

Salt injury generally occurs when susceptible trees are growing close to highways to which salt is applied during the winter. Damage tends to be heavier near curves, where greater amounts of spray are produced. In Northern Region, eastern white pine is the main susceptible species.

Heavy damage occurred along Highway 101 northeast of the town of Chapleau. In this area, centered around Borden Township, small trees less than 1.5 m tall were severely injured, and some mortality has occurred. Semimature trees up to 8 m tall in the same area had the bottom 5 m of their foliage killed. Heavy damage occurred to 2-m trees growing along Highway 144 in Hazen Township, Gogama District.

Elsewhere in the region, light damage was commonly observed.

FOREST HEALTH

Acid Rain National Early Warning System (ARNEWS)

Plots established across the region in 1985 in the Kapuskasing, Chapleau and Kirkland Lake districts are monitored annually for insect and disease activity and for any changes in crown form

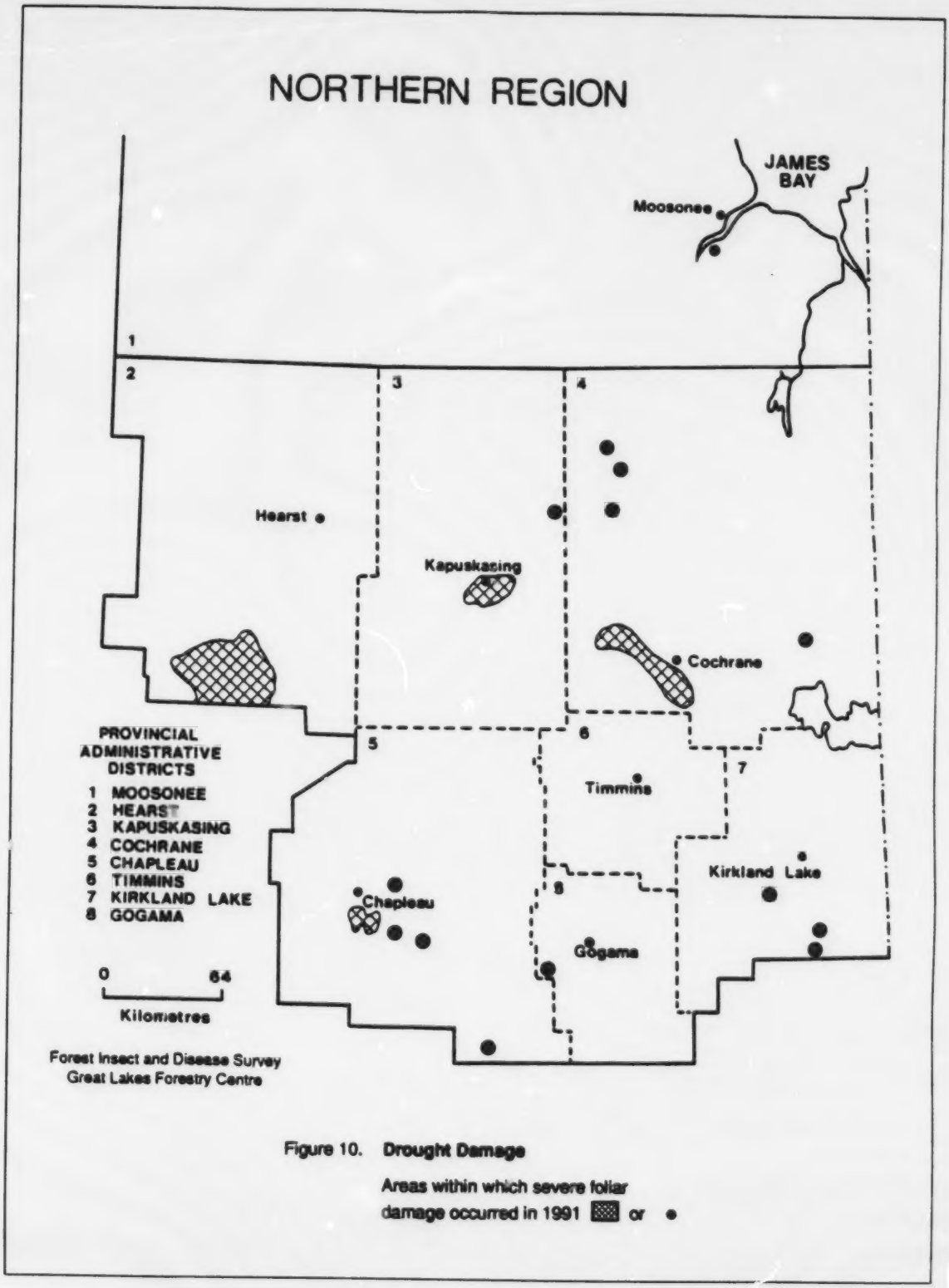


Figure 10. **Drought Damage**

Areas within which severe foliar damage occurred in 1991 ▩ or ●

or the presence of tree abnormalities. Ground vegetation plots and regeneration plots are also monitored annually.

Mortality of suppressed trees continued in all plots examined this year (two deaths in each of the three plots) and two additional trees died in the Kapuskasing plot as a result of wind damage in 1990. Acid rain symptoms have yet to be recorded in any of these three plots, but drought conditions, particularly in the Kirkland Lake plot, have resulted in sparse foliage on many of the trees.

No insect or disease conditions were recorded in any of the three plots in 1991.

White Birch Health

Concern expressed about the relative health of white birch across Northern Region led to the establishment of two semipermanent birch dieback plots in 1989.

The plots established in the Cochrane and Chapleau districts are examined annually from the air and are re-tallied on the ground to detect changes in crown color or vigor, and each tree is assigned a relative crown dieback rating (Table 23).

Comparisons of the past 2 years' data appear to indicate that the trees initially tallied with >20% dieback have continued to deteriorate, and mortality has increased; the conditions of trees in the <20% dieback classes have remained much the same as in 1990.

SPECIAL SURVEYS

Black Army Cutworm, *Actebia fennica* (Tausch.)

Surveys for this insect, which began in 1990, continued in 1991. Areas that were pheromone trapped in the Chapleau and Hearst districts in 1990 were examined in the spring of this year to detect damage caused by this insect. In none of the six areas examined was any damage found on the newly planted seedlings.

Later in 1991, a pheromone trapping program was carried out in four areas that had been burned. Three of these areas were on former prescribed burns and one in Gouin Township, Gogama District, was at the site of a spring wildfire. Results of this trapping program are presented in Table 24.

Table 24. Results of the black army cutworm pheromone trapping program in the Northern Region of Ontario in 1991.

Location (Twp)	Number of traps	Total number of male moths caught
Chapleau District		
Borden	2	21
Gogama District		
Gouin	2	13
Hearst District		
Haig	2	640
Marjorie	2	1,772

Table 23. Birch health at two locations in the Northern Region of Ontario in 1990 and 1991 (100 trees were examined at each location).

Location	Average height (m)	Average DBH (cm)	Year	Cumulative dieback class[a] 0	1	2	3	4	5
Chapleau District									
Borden Twp	14.5	25.0	1990	22	33	26	11	7	1
			1991	26	26	14	16	9	9
Cochrane District									
Detour Lake Rd. km 120	14.3	23.2	1990	11	58	25	4	1	1
			1991	9	56	24	6	0	5

[a] 0 = 0–5%, 1 = 6–20%, 2 = 21–40%, 3 = 41–60%, 4 = >60%, 5 = dead

Forest Tree Nursery Report

As in previous years, a minimum of six visits were made to each of the three nurseries in the region (Chapleau, Gogama and Swastika). During each visit, the nurseries were checked extensively for problems and nursery staff were also asked to identify any areas of concern.

At Chapleau Nursery, as in the previous 2 years, there was a trace amount of mortality (approximately 2 to 3%) due to the root rot *Cylindrocladium scoparium* Morgan. As well, there was 5 to 6% mortality of the recently planted black spruce as a result of "beating" damage from heavy rains and hail. Young, naturally growing black spruce near the growing stock were heavily attacked by spruce needle rust, *Chrysomyxa ledi*. Although no damage occurred on the growing stock, 100% of the natural black spruce was affected, with 50 to 60% foliar damage.

Winter drying of young 1.5-m eastern white pine growing as a windrow was encountered at Gogama Nursery. This condition caused 10 to 15% mortality. In the same area, 2-m white spruce being grown as archive stock were infested by the yellowheaded spruce sawfly. Approximately 35% of the trees were affected, with 10 to 15% defoliation. These same trees also had low levels of spruce budworm on them.

At Swastika Nursery, *Cylindrocladium scoparium* was the cause of 2 to 3% mortality in five of the growing compartments. The yellowheaded spruce sawfly was also encountered on spruce hedgerows. Jack pine archive trees at this nursery were damaged by the white pine weevil (1% of the trees) and by the pine shoot borer (8% of the trees, 3% on the main leader). As at Chapleau Nursery, black spruce surrounding the nursery were infected with spruce needle rust. A suspected nutrient deficiency caused a purple discoloration of the tips of spruce seedlings growing in most seedbeds.

Gypsy Moth Pheromone Trapping

Gypsy moth (*Lymantria dispar* [L.]) pheromone traps were deployed again in 1991 in 12 provincial parks and one recreation area in the region. Generally, trace populations (from 1 to 3 adult males) were captured infrequently in this trapping exercise. This trend continued, with small numbers of moths being caught in six parks. The highest counts were found in Dublin Township, Gogama District, where four moths were trapped (Table 25). As in previous years, two traps were

Table 25. Areas in which male gypsy moths have been caught in the Northern Region of Ontario, 1987–1991.

District / Location	Number of moths trapped				
	1987	1988	1989	1990	1991
Chapleau District					
Ivanhoe Lake Prov. Park	–	–	–	–	3
Missinaibi Lake Prov. Park	–	–	1	–	–
Mississagi Wild River Prov. Park	–	–	1	1	–
Wakami Lake Prov. Park	–	–	–	–	–
Gogama District					
Dublin Twp, Muldrew Lake	n/a[a]	n/a	n/a	n/a	4
Hearst District					
Fushimi Lake Prov. Park	1	–	–	–	1
Kapuskasing District					
Remi Lake Prov. Park	–	–	–	1	2
Kirkland Lake District					
Esker Lakes Prov. Park	–	1	1	13	3
Kap–Kig–Iwan Prov. Park	–	1	3	14	1
Timmins District					
Kettle Lakes Prov. Park	1	–	–	2	–

[a] not trapped

deployed in all parks except those in which positive catches were recorded in 1990. When new positive catches are recorded at any location, an additional eight traps (for a total of 10) are deployed the following year to monitor a potential build-up of adult male moths in the area more closely.

Seed Orchard Survey

Special seed orchard surveys were again conducted in the Island Lake Tree Improvement Area in Chapleau District and the Aidie Creek complex in Kirkland Lake District. A third seed orchard was surveyed this year at the Bonner Centre in Kapuskasing District (Tables 26–29). Black spruce was evaluated at the above three locations and jack pine was also evaluated at the Chapleau and Kirkland Lake orchards. Timing of the two visits to each orchard (mid-June and at the end of July) was planned to coincide with the periods of peak insect and disease activity.

Table 26. Insect damage in three black spruce seed orchards in the Northern Region in 1991 of Ontario (results based on an examination of 150 randomly selected trees at each location).

	Chapleau	Kirkland Lake	Kapuskasing
	Island Lake TIA[a]	Aidie Creek	Bonner Centre
Average height (m)	0.9	1.3	0.8
Area (ha)	12	13	6
Number of trees/ha	2,500	2,500	2,500
Spruce budworm: trees affected (%)	3.3	0.7	10.7
Spruce coneworm: trees affected (%)	0	0	0
Defoliation by: budworm/coneworm (%)	1	0	0
Yellowheaded spruce sawfly: trees affected (%)	0	10.7	11.3
defoliation (%)	0	14.2	4.0
White pine weevil: leaders affected (%)	19.7	0.7	2.0
Pine spittlebug: trees affected (%)	0	6.0	0.7

[a] Tree Improvement Area

Table 27. Disease damage in three black spruce seed orchards in the Northern Region of Ontario in 1991 (results based on an examination of 150 randomly selected trees at each location).

	Chapleau	Kirkland Lake	Kapuskasing
	Island Lake TIA[a]	Aidie Creek	Bonner Centre
Average height (m)	0.9	1.3	0.8
Number of trees/ha	2,500	2,500	2,500
Area (ha)	12	13	16
Frost injury: trees affected (%)	0	0	0
foliar damage (%)	0	0	0
Armillaria root rot: trees affected (%)	0	0.7	0
Needle rust: trees affected (%)	0	4.0	61.3
foliar damage (%)	0	2.7	2.0
Diplodia tip blight: trees affected (%)	0	0	0
Cone rust: trees affected (%)	0	0	0
cones affected (%)			
Miscellaneous diseases	0	0	0

[a] Tree Improvement Area

Table 28. Insect damage in two jack pine seed orchards in the Northern Region of Ontario in 1991 (results based on an examination of 150 randomly selected trees at each location).

	Chapleau Island Lake TIA[a]	Kirkland Lake Aidie Creek
Average height (m)	2.1	3.8
Number of trees/ha	2,500	2,500
Area (ha)	12	10
Jack pine budworm: trees affected (%)	0	0
defoliation (%)	0	0
Jack pine sawflies: trees affected (%)	0	0
number of colonies	0	0
defoliation (%)	0	0
White pine weevil: leaders affected (%)	7.3	10.0
Pine shoot borer: laterals affected (%)	24.0	30.7
leaders affected (%)	6.7	6.0
Jack pine tip beetle: leaders affected (%)	0	0
Swaine sawfly: trees affected	0	0
number of colonies	0	0
defoliation (%)	0	0
Pine spittlebug: trees affected (%)	29.0	10.0

[a] Tree Improvement Area

Table 29. Disease damage in two jack pine seed orchards in the Northern Region of Ontario in 1991 (results based on an examination of 150 randomly selected trees at each location).

	Chapleau Island Lake TIA[a]	Kirkland Lake Aidie Creek
Average height (m)	3.8	2.1
Number of trees/ha	2,500	2,500
Area (ha)	12	10
Needle rust: trees affected (%)	63.0	64.7
foliar damage (%)	6.0	8.5
Needle cast: trees affected (%)	1.3	14.0
foliar damage (%)	10.0	7.2
Armillaria root rot: trees affected (%)	0	0
Scleroderris canker: trees affected (%)	0	0
severely affected (%)	0	0
Western gall rust: trees affected (%)	2.7	0
severely affected (%)	1.3	0
Stem rust: trees affected (%)	0	0
miscellaneous diseases	0	0

[a] Tree Improvement Area

In the black spruce orchards, the most significant problem was 11% defoliation by spruce budworm in the Kapuskasing orchard. Defoliation by the yellowheaded spruce sawfly was recorded on approximately 10% of the trees in both the Kirkland Lake and the Kapuskasing orchards. White pine weevil damage presented a problem only in the Chapleau Tree Improvement Area.

Needle rust, although present in the Kirkland Lake and Kapuskasing orchards, did not constitute a serious threat (defoliation levels averaged 2%).

In the jack pine orchards, the main concern was for damage to the terminal shoots. In the Kirkland Lake orchard, the white pine weevil caused 10% terminal damage, compared with 7.3% damage in the Chapleau Tree Improvement Area. The pine shoot borer, on the other hand, damaged a greater percentage of the trees but approximately the same percentage of terminal shoots as the weevil.

In the Chapleau orchard, 24% of the trees sustained damage to lateral shoots and 6.7% of terminal shoots were damaged, whereas 31% of the trees sustained damage to lateral shoots and 6.0% to terminal shoots in the Kirkland Lake orchard. Although the percentage of trees affected by needle cast and needle rust organisms appeared high in both orchards, foliar damage levels remained low and this should constitute no immediate threat to tree vigor.

Climatic Data

Temperature and precipitation have a great deal of influence on the presence and development of insect and disease organisms, and can facilitate or hinder the development of their populations greatly from year to year. Similarly, adverse weather conditions can cause abiotic damage (e.g., hail, blowdown, drought) to the host trees that could predispose them to insect or disease attack.

For this reason, we have included current weather (temperature and precipitation) data along with a column for the deviation from normal (30-year average) values for a representative selection of weather stations across the region (Table 30).

Table 30. Mean temperatures and total precipitation at three locations in the Northern Region of Ontario in 1991.

Location	Month	Mean temperature (°C)		Deviation from normal	Total precipitation (mm)		Deviation from normal
		Normal	Actual	(°C)	Normal	Actual	(mm)
Chapleau	January	–16.9	–16.3	+0.6	46.9	71.2	+24.3
Airport	February	–15.8	–11.1	+4.7	34.5	18.6	–15.9
	March	–8.3	–6.3	+2.0	56.2	69.8	+13.6
	April	0.6	4.4	+3.8	59.3	47.0	–12.3
	May	8.6	12.0	+3.4	73.8	81.0	+7.2
	June	14.3	16.5	+2.2	100.4	108.2	+7.8
	July	16.8	16.8	0.0	81.8	93.4	+11.6
	August	15.4	16.9	+1.5	86.2	83.0	–3.2
	September	10.4	9.4	–1.0	101.5	98.8	–2.7
	October	4.9	n/a[a]	n/a	75.7	n/a	n/a
	November	–3.5	n/a	n/a	64.2	n/a	n/a
	December	–12.8	n/a	n/a	53.5	n/a	n/a
Earlton	January	–16.3	–17.3	–1.0	56.4	39.6	–16.8
Airport	February	–14.1	–10.6	+3.5	47.2	14.4	–32.8
	March	–7.6	–6.3	+1.3	58.0	73.0	+15.0
	April	1.9	4.6	+2.7	50.0	67.1	+17.1
	May	9.8	12.5	+2.7	61.3	50.6	–10.7
	June	15.2	17.2	+2.0	89.2	50.6	–38.6
	July	17.7	18.8	+1.1	80.8	59.5	–21.3
	August	16.2	17.6	+1.4	83.4	80.6	–2.8
	September	11.1	10.3	–0.8	99.1	104.6	+5.5
	October	5.4	5.0	–0.4	70.0	109.7	+39.7
	November	–2.5	–1.8	+0.7	70.6	35.4	–35.2
	December	–12.6	–12.1	+0.5	65.3	42.2	–23.1

(cont'd)

Table 30. Mean temperatures and total precipitation at three locations in the Northern Region of Ontario in 1991 (concl.).

Location	Month	Mean temperature (°C) Normal	Mean temperature (°C) Actual	Deviation from normal (°C)	Total precipitation (mm) Normal	Total precipitation (mm) Actual	Deviation from normal (mm)
Kapuskasing	January	–18.6	–20.7	–2.1	53.6	45.9	–7.7
Airport	February	–16.2	–12.7	+3.5	43.0	25.9	–17.1
	March	–9.4	–8.1	+1.3	55.4	91.5	+36.1
	April	0.5	3.7	+3.2	53.2	19.4	–33.8
	May	8.3	11.0	+2.7	74.3	60.6	–13.7
	June	14.1	16.3	+2.2	84.7	111.3	+26.6
	July	16.8	17.5	+0.7	96.3	80.9	–15.4
	August	15.3	16.6	+1.3	92.5	107.7	+15.2
	September	10.0	9.4	–0.6	94.4	134.6	+40.2
	October	4.4	2.5	–1.9	77.4	116.6	+39.2
	November	–2.4	–4.4	–2.0	80.1	85.8	+5.7
	December	–16.4	–13.5	+2.9	53.3	47.7	–5.6

[a] n/a = not available